

METRO 2040

Modal Targets Project

Evaluation of Potential Measures for Achieving Modal Targets

Final Report



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Executive Summary

Background and Methodology

Metro's Regional Transportation Plan (RTP) is the blueprint that guides investment in the Portland metropolitan region's transportation system for all forms of travel – motor vehicle, transit, bike, pedestrian and freight. The 20-year plan, last updated in 2004, includes 2040 modal targets and specific actions to reduce the number of drive-alone trips as part of the region's strategy to support the 2040 Growth Concept, provide travel options, reduce vehicle emissions, decrease congestion and increase capacity for freight movement. A basic construct of the 2040 Growth Concept is to reduce the region's reliance on the automobile by focusing growth in centers and along major transportation corridors. It relies on a balanced transportation system that accommodates walking, bicycling, driving, transit and national and international goods movement. The RTP includes policies and projects to expand travel choices throughout the region, and encourage transit, walking, bicycling and carpooling.

The RTP identifies 2040 Non-Single Occupancy Vehicle (Non-SOV) Targets in place of and consistent with the Oregon Transportation Planning Rule (TPR) requirement to reduce vehicle miles of travel (VMT) per capita. The mode share targets are intended to be goals for cities and counties to work toward as they implement the 2040 Growth Concept and RTP at the local level. As required by the RTP and the TPR, jurisdictions within the Metro region must adopt policies and actions that encourage a shift towards non-SOV modes (Section 6.47 of the RTP). The TPR also requires Metro and other Metropolitan Planning Organizations to evaluate the effectiveness of these measures.

The ultimate goal of this project is to help Metro set realistic and defensible procedures and strategies for implementation by local jurisdictions in complying with RTP targets to reduce drive-alone trips in the region. With this goal as their focus, Metro staff, with the assistance of a consulting team led by Cogan Owens Cogan and Alta Planning + Design, undertook the following three major activities:

- Summarized existing Metro non-SOV mode share targets and related requirements, current efforts of a sample of local jurisdictions to meet these requirements, and ways in which these efforts are being measured and evaluated.
- Conducted and summarized the results of a comprehensive literature review of the effectiveness of strategies employed by various entities that are required or recommended by Metro to meet non-SOV mode share targets.
- Identified recommendations for future RTP requirements including minimum and supplemental requirements to meet modal targets, as well as best practices for implementation, procedures to measure effectiveness and processes to monitor compliance.

During each of these steps, a Project Oversight Committee and members of Metro's Transportation Policy Advisory Committee (TPAC) reviewed and commented on draft work products and provided guidance for subsequent tasks. The methodology for these tasks is described in more detail in subsequent sections of this report.

Organization of the Report

The remainder of this report is organized as follows:

- **Chapter 1 – Introduction.** This chapter provides a more detailed description of project objectives and methodology.
- **Chapter 2 – Existing Requirements.** This chapter summarizes existing Metro requirements for meeting modal targets, use of the Metro travel model to measure projected impacts on mode share, and methods by which selected jurisdictions in the region are helping meet the targets.
- **Chapter 3 – Strategies and Tools for Implementation.** This chapter describes strategies recommended to meet modal targets, including:
 - How they work
 - Their relative effectiveness in shifting mode share
 - Best practices for implementation
 - Procedures for measuring success and monitoring implementation

This chapter also identifies additional recommendations to help achieve modal targets and test effectiveness of specific strategies, as well as specific potential changes to the RTP.



- **Chapter 4 – Next Steps.** This chapter identifies how Metro expects to use the results of this report in the process of updating and implementing the RTP.
- **Appendices.** These provide more detailed information about Metro requirements, local implementation, research results, and summaries of advisory group meetings conducted during this project.

Summary of Findings and Conclusions

Following is summary of findings and conclusions that resulted from this project. They are described in more detail in Chapters 2 and 3.

Current Efforts to Achieve Modal Targets and to Measure Progress Toward Targets

Currently, the RTP requires local jurisdictions to implement the following strategies to help achieve modal targets:

1. Adopt 2040 modal targets in local Transportation System Plan (TSP) policies
2. Adopt street connectivity plans and implementing ordinances
3. Adopt maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan
4. Form and support transportation management associations (TMAs) where appropriate
5. Adopt fareless area transit policies in regional centers

6. Adopt transit strategies, including planning for adequate transit facilities and service; pedestrian facility planning and infrastructure that support transit use; location and design of buildings in transit zones that encourage transit use; and adoption of a transit system map, consistent with Metro requirements.

In addition to the six approaches listed above, the RTP identifies a variety of other tools related to land use, transit, bicycling, walking, parking, and employer-based strategies that may be considered or implemented by local jurisdictions. These are described in more detail in Chapters 2 and 3 of this report. In addition to Metro's requirements, the Oregon Department of Environmental Quality (DEQ) requires local companies and agencies having more than 50 employees to implement Employee Commute Options (ECO) programs to reduce drive-alone commute trips. While many of the jurisdictions provide some technical support to help companies comply with the ECO rule, TMAs and TriMet provide most of the support for employers' trip reduction programs through Metro's Regional Travel Options (RTO) Program. Partner agencies include Metro, TriMet, SMART, C-TRAN, Oregon DEQ, ODOT, Oregon Office of Energy, Port of Portland, the cities of Portland and Gresham, and Clackamas, Multnomah and Washington counties.

Metro evaluates local progress toward achieving the non-SOV modal targets through periodic updates to the RTP. Metro also reviews local TSPs of the 25 cities and three counties within the region using a checklist to ensure that RTP requirements are being met as they pertain to preparation of TSPs.

Metro estimates the impact of strategies primarily through its regional travel model. Appendix 1.8 of the RTP: "Transportation Analysis Zone Assumptions for Parking Transit and Connectivity Factors," identifies specific modeling assumptions by transportation analysis zone that are intended to mirror the expected improvements and programs proposed in the RTP and their impact on mode choice. The model provides relatively accurate and measurable mode share results from connectivity, transit and parking strategies that are incorporated into the model. It is less accurate in assessing the effect of pedestrian, bicycle, and ride-sharing strategies.

A survey of a sample of local jurisdictions in the region shows that most are making substantial progress in implementing existing Metro requirements. Table 1 summarizes results of this survey.

Table 1. Summary of Major Transportation Demand Management (TDM) Measures by Jurisdiction

TDM Measure	Portland	Beaverton	Gresham	Wilsonville	Oregon City	Clackamas County
Modal Targets (RTP)	●	●	●	●	●	●
Parking Management and Requirements (RTP)	●	●	●	●	●	●
Support of TMAs (RTP)	●	●	●	⊙	○	●
Roadway Connectivity Requirements (RTP)	●	●	●	●	⊙	●
Transit Pass Program in Regional Centers (RTP)	●	●	○	●	○	⊙
Other Transit Strategies	●	●	●	●	●	●
Neighborhood-based Travel Management	●	○	○	⊙	○	○
Development Incentives	●	●	●	●	○	⊙
Implementing Bicycle/Pedestrian Facilities	●	●	●	●	●	●
Carpool/ Match	●	○	●	⊙	○	●
Other	Carshare support	○	○	Shuttles	○	⊙

Sources of Data: City of Wilsonville TSP, Clackamas County TSP, Clackamas County Zoning Ordinance 1007.07, Clackamas County Comprehensive Plan, City of Gresham TSP, City of Portland TSP, City of Portland Comprehensive Plan, City of Beaverton TSP, City of Oregon City TSP, and telephone interviews with staff of respective jurisdictions.

Legend:

- Not in TSP or Codes
- ⊙ In TSP
- In TSP or Codes and currently implementing

Although local jurisdictions are making progress in meeting Metro requirements for implementation, relatively little has been done to evaluate the effectiveness of specific strategies at the local level, in part because local evaluation is not required and can be costly and difficult, given limited local resources. Of the six jurisdictions surveyed, only the City of Portland is actively measuring the causal effects of a specific TDM initiative, using its TravelSmart™ program. The City of Portland also has been tracking bicycle use over time in the central city and other areas, and analyzing the correlation between bikeway facilities and bicycle demand, safety, and other factors. In addition, TMAs and employers have been measuring progress towards mode shift targets through employee-questionnaires as part of ECO-rule requirements.

During the past 10 years, the RTO program has focused on working with ECO employers to reduce drive-alone commute trips. The program evaluates itself annually to better understand and respond to changes in individual travel behavior. Included in the data are survey reports from each employment site subject to ECO rules, plus sites surveyed voluntarily (those with 50 or fewer employees). The program surveys employees about their travel behaviors to provide employers with appropriate strategies for increasing non-SOV use. Initial surveys also help identify baseline measures of mode share to be monitored over time. Additional annual surveys gauge the effects of

programs and improvements and monitor progress towards the mode-shift goal for a particular employment site. The annual reports also identify other strategies that, if implemented, may help reduce drive-alone trips. Current data shows non-drive-alone trips to and from work increased from 26 percent in 1996 to 31 percent in 2003.¹

More recent travel behavior research indicates that most trips are not work related. The RTO program and subcommittee are taking a new direction to better address non-work-related trips through a newly envisioned collaborative marketing program. New survey tools will be developed that measure the impact of the RTO program marketing efforts on increased use of non-auto modes of transportation. New evaluation techniques identified through this project and future RTO program efforts also may help the region better measure progress toward achieving the RTP's regional non-SOV modal targets.

Research on Effects of Strategies

For this project, the project team conducted a comprehensive literature review of studies that have assessed the effectiveness of a variety of transportation demand management (TDM) measures. For the purpose of this study, TDM measures include all strategies that are being implemented to reduce SOV use and/or encourage non-SOV use. These include measures currently required of local jurisdictions in the Metro region or identified as other possible strategies for consideration, such as transit, bike, and pedestrian infrastructure improvements, land use strategies, pricing and encouragement programs. A primary goal of this research was to identify existing research results that show direct and measurable correlations between implementation of specific strategies and effects on mode share. As noted below, this goal proved to be somewhat elusive. However, the research still yielded useful results. Summary observations include:

- It is very difficult to quantify the direct effect of any individual strategy on mode share; few studies have isolated and attributed changes in mode share to specific tools. Availability of quantitative measures of effectiveness varied significantly by strategy.
- Although a limited number of studies document quantitative relationships of cause and effect, a significant amount of research shows that the strategies required or recommended by Metro to reduce SOV mode share are effective in varying degrees.
- Individual strategies are generally more effective when used in combination with a variety of strategies.
- Different strategies have various levels of effectiveness in different parts of the region. Factors such as density of development (both residential and employment density), access to transit, level of connectivity, proximity to major employment centers, and other conditions affect potential effectiveness.
- The effectiveness of strategies, particularly in newly developed or developing areas, needs to be measured over a long period of time. Continued monitoring and measurement, including through use of Metro's regional travel model, is essential to gauge long-term effectiveness.
- The most effective strategies included parking pricing, transportation-efficient development and area-wide application of peak-period or mileage-based pricing strategies. A variety of other strategies also have documented impacts on mode share.

¹ 2003 Regional Travel Options Program Evaluation Report, page 6.

- Data collection is critical to monitoring the effectiveness of strategies (and measuring their success).

Table 2 summarizes the results of our research, as well as potential applicability in the Portland region and ease of implementation by local jurisdictions or others. Assessments of applicability are relative in comparison to other potential strategies. More detailed information is found in Chapter 3 and Appendix E.

Table 2. Summary of Literature Review Research

Strategy	Quantitative Evidence (SOV)	U.S. Studies	Oregon Studies	Relative Ease of Implementation	Applicability (PDX Region)	Regional Applicability				Modal Share Impact
						Central City, Regional and Town Centers	Targeted Areas	Transit/Mixed-use Corridors	Other Urban Areas	
Land Use										
Connectivity	○	●	●	◐	●	✓	✓	✓	✓	1% - 2% VMT
Transportation-Efficient Development	●	●	●	◐	●	✓		✓		15% - 24% SOV ¹²
Parking										
Parking Pricing	●	●	●	●	●	✓	✓	✓	✓	2.5% - 5% SOV ¹² 20% SOV ¹ 5% - 35% SOV ¹
Parking Supply and Management	●	●	●	◐	◐	✓		✓		28% RDI ¹ ; 40% - 50% PKD
Timed Parking	●	●	○	●	●		✓			
Fare Free Area										
Fareless Area	●	●	●	◐	◐	✓				2% - 3% SOV
Transit										
Bus Service Improvements	◐	●	●	●	●	✓	✓	✓	✓	4% - 30% RDI
Demand Responsive / ADA Service	○	●	○	◐	●	✓	✓	✓	✓	40% wheelchair RDI
High Capacity Transit Service	◐	●	◐	◐	●	✓		✓		20% - 72% of new riders shifted mode from auto; 92% RDI over previous bus route
HOV Lane	◐	●	○	◐	◐			✓		Reduce vehicle trips 4% - 30%
Park-and-Ride/ Carpool Lots	●	●	●	◐	●				✓	40% - 60% SOV ²
Pricing and Fares	●	○	●	◐	○					18% SOV; 12% - 59% mode shift from auto
Site Design / Accessibility	●	●	○	◐	●	✓	✓	✓	✓	2% to 4.75% SOV ¹²
Transportation Management and Employer-Based Strategies										
Alternate Work Schedule and Telecommute	◐	●	○	●	●	✓	✓	✓	✓	Auto commute reduced 7% - 10% ⁹
Carshare	◐	●	●	◐	●	✓				47% VMT ¹⁰
Guaranteed Ride Home	○	●	○	◐	●				✓	N/A

Strategy	Quantitative Evidence (SOV)	U.S. Studies	Oregon Studies	Relative Ease of Implementation	Applicability (PDX Region)	Regional Applicability				Modal Share Impact
						Central City, Regional and Town Centers	Targeted Areas	Transit/Mixed-use Corridors	Other Urban Areas	
Rideshare	○	●	○	◐	●	✓	✓	✓	✓	Represents 2% - 7% of commute trips
Shuttle Service	--	--	--	--	--				✓	N/A
Marketing and Promotion	◐	●	●	●	●	✓	✓	✓	✓	21% RDI
Bicycle and Pedestrian										
Bikeway Improvements	◐	○	●	●	●	✓	✓	✓	✓	1 – 4% SOV; 100 – 150% Bike RDI ¹³
Elimination of Auto Access	--	--	--	--	--	✓				N/A
Encouragement, Promotional and Individualized Marketing Programs	●	●	●	●	●	✓	✓	✓	✓	6% SOV; 12% VMT
End-of-Trip Facilities	●	●	●	◐	●	✓	✓	✓	✓	77% SOV ⁴
Free Bike and “Smart Bike” Programs	○	○	●	◐	◐		✓			N/A
Pedestrian Improvements ⁷	--	--	--	--	--	✓	✓	✓	✓	N/A
Safe Routes to School	●	●	○	●	●	✓	✓	✓	✓	13% SOV ¹¹
Traffic Calming	○	○	○	◐	◐	✓	✓	✓	✓	5% - 54% Ped/Bike RDI
Pricing										
Congestion Pricing	●	●	●	●	◐	✓	✓	✓	✓	15% – 30% transit RDI; 1% - 3% SOV; 28% - 30% transit shift ³
Vehicle Miles Traveled Tax	○	○	○	○	○	✓	✓	✓	✓	13% VMT ⁵
Vehicle Miles Traveled Insurance	○	●	○	◐	◐	--	--	--	--	13% VMT ⁶

Evidence of Mode Share Impact

-- = No evidence

● = Direct evidence of impact on SOV use or mode share

◐ = Anecdotal relationship, including quantitative evidence of change in VMT

○ = Indirect relationship based on anecdotal evidence

Examples and Data Availability

● = Yes

○ = No

Implementation and Applicability

● = High (easy to implement or very applicable)

◐ = Moderate

○ = Low (difficult to implement or relatively un-applicable)

Modal Share Impact

SOV = Single occupancy vehicle trips

VMT = Vehicle miles traveled

RDI = Ridership increase

PKD = Parking demand

Table 2: Notes

1. Applies to commuting trips only.
2. Applies only to percentage of people using park-and-ride lots who switched from SOV to carpool or transit use.
3. Some figures apply only to users of priced facilities.
4. Applies only to percentage of people using BikeCentral who switched from SOV to bicycle commute.
5. Extrapolated from modeling results.
6. Extrapolated from modeling results; applies only to mileage-based insurance policy-holders.
7. See connectivity for related effects, including quantitative measure of impacts.
8. Some studies used apply only to those surveyed who drove to work before they lived near transit.
9. Estimates based on modeling.
10. Applies only to participants in carsharing program.
11. Applies to participants in Safe Routes To School program.
12. Extrapolated from a study of this strategy's effects on SOV commute trips and assumes that commute trips make up 25% of all trips.
13. Studies reviewed for this effort indicate this range of impact. However, impacts can be even more significant over time. For example, bicycle ridership on some facilities in the Portland area has increased from about 200 to several thousand riders a day, an increase of several thousand percent.

Implications for Application in This Region

Many of the strategies researched for this project already are required by the RTP or the TPR and are being implemented to varying degrees in this region. They have been successful in increasing the share of bicycling, walking, transit and other non-SOV trips and include:

- Connectivity plans for new residential and mixed-use areas are required by local jurisdictions and implemented throughout the region.
- Fareless transit service areas have been implemented downtown extended to Lloyd District in Portland, and in Wilsonville. Fareless areas could be implemented in other regional centers in the future in coordination with transit service providers. Requirements related to this strategy are expected to be revisited as part of the RTP update.
- Transit-oriented design is required and implemented by local jurisdictions in specific areas. It is applicable throughout the region and most effective in denser residential, employment or mixed-use areas, including town and regional centers and transit corridors.



- Transportation-efficient development (i.e., higher density and mixed use development with access to frequent transit service and bike and pedestrian facilities and with opportunities for short pedestrian and bicycle trips to near by destinations) is applied through housing and employment targets for regional and town centers and corridors in the region. This strategy is most applicable in these denser areas of the region.
- Parking maximum ratios are required through Title 2 of Metro's functional plan and have been implemented by most jurisdictions in the region. They are implemented throughout each jurisdiction.
- Formation and support for TMAs currently is required for all jurisdictions in the region. To date, they have been implemented in Portland, Troutdale, Gresham, Clackamas and northwestern Washington County through the Westside Transportation Alliance. They are most

applicable and effective in major employment centers with good access to transit, bicycle and pedestrian facilities. Requirements related to this strategy are expected to be revisited as part of the RTP update.

Other strategies that could be required and/or implemented by local jurisdictions through requirements in the RTP have varying applicability throughout the region, including the following:

- More aggressive parking pricing and management policies are recommended for future consideration but are likely to be effective only in areas without free or unmanaged on or off-street parking alternatives.
- Though not required by the RTP, bicycle and pedestrian improvements are mandated by state and federal requirements for specific facilities and are being implemented by local jurisdictions throughout the region. They are applicable in all areas of a given jurisdiction but likely to be most effective along major travel routes and easiest to implement in newly developing areas or as part of major transportation system improvements. Pedestrian improvements in particular are likely to be most effective in areas with the potential for high pedestrian use and to provide access to transit facilities.
- A variety of other bicycle-oriented strategies (end of trip facilities, promotional programs, etc.) can be implemented throughout the region but will have the greatest impact in major employment areas, including downtown Portland and regional and town centers.
- Frequent, comprehensive transit service is being implemented and is applicable throughout the region. Higher frequency service and certain types of facilities (e.g., light rail transit) require a certain level of residential or employment density to be cost-effective and successful.
- Notwithstanding successful local examples in the City of Portland, TravelSmart™ programs are expected to be best applied at the regional level, because of the cost and staffing resources associated with this individualized marketing approach. Data collection is also a critical component of this program.
- Pricing strategies, including peak period pricing and mileage-based insurance or fees can be implemented primarily by regional or state governments or the private sector. Facility-based pricing may be implemented by Metro and ODOT, with the cooperation of local governments on major highway facilities. Area-wide pricing is unlikely to be implemented in the foreseeable future.

Summary Recommendations

Following are recommendations for strategies to achieve modal targets, as well as procedures to measure their success and local jurisdiction and Metro compliance in meeting requirements. Suggested amendments to the RTP also are briefly summarized. These recommendations are described in more detail in Chapter 3.

Minimum and Other Requirements

The following **existing minimum requirements** are recommended for ongoing implementation and monitoring:

- Modal targets adopted in local TSPs

- Connectivity planning requirements
- Transit-oriented design requirements
- Maximum parking ratios

Two existing minimum requirements – formation of and support for TMAs and adoption of fareless areas – are recommended to be revisited and possibly eliminated as minimum requirements for all jurisdictions as part of the upcoming RTP update process. These two strategies would continue to be encouraged where feasible and where they are likely to be effective.

The following **additional minimum requirements** are recommended to be considered as part of a safe-harbor approach (i.e., acceptable, minimum set of strategies) for local jurisdictions during the next RTP update process.

- Continue to require **transportation-efficient development** through efforts to meet density and other land use targets in centers and corridors as part of compliance with Metro Functional Plan and related requirements. This type of development includes higher density and mixed use development with access to frequent transit service and bike and pedestrian facilities and with opportunities for short pedestrian and bicycle trips to near by destinations. Local jurisdictions and the region as a whole would be given credit for these efforts as part of the modal targets monitoring process.
- Construct **bicycle and pedestrian improvements** as required by state and federal regulations, and consistent with local TSPs and regional guidelines. Local governments and Metro should prioritize improvements that enhance connectivity of the bicycle and pedestrian system and access to transit.
- Continued provision of **frequent and comprehensive transit service** by TriMet and other transit agencies. Local jurisdictions and the region as a whole would be given credit for these efforts as part of the modal targets monitoring process.
- Support and encourage efforts to implement **employer-based TDM strategies**.
- Encourage efforts to **eliminate employer-subsidized parking** and/or support for parking cash-out, preferred HOV-parking or **other parking pricing strategies**. This strategy ultimately would be implemented primarily by the private sector. However, local governments would be required to encourage such practices and consider them in parking management and design regulation efforts. Local governments also could be required or encouraged to consider use of these strategies for their own employees.
- Support and coordinate **Safe Routes to School programs** and projects. Local jurisdictions and Metro should support and help coordinate these efforts by seeking and procuring project funding from federal, state and local sources, and providing technical assistance.

A variety of additional strategies are recommended for consideration by local jurisdictions, advocacy groups and private employers, including the following:

STRATEGY	PRIMARY IMPLEMENTATION ENTITY	SUPPORTING IMPLEMENTATION ENTITY
<i>Parking</i>		
<ul style="list-style-type: none"> Additional parking management and supply strategies 	Local Jurisdictions	Private Sector, Metro
<i>Transit</i>		
<ul style="list-style-type: none"> Bus service improvements 	Transit Agencies, SMART, Metro	Local Jurisdictions
<ul style="list-style-type: none"> High capacity transit (Light rail, streetcar and bus rapid transit) 	Transit Agencies, Metro, Local jurisdictions	Local Jurisdictions
<ul style="list-style-type: none"> Demand responsive / ADA service 	TriMet, Metro	Employers
<ul style="list-style-type: none"> Marketing and Promotion, including individualized marketing (e.g., TravelSmart™) 	Transit Agencies	Local Jurisdictions, Employers
<ul style="list-style-type: none"> Park-and-ride and carpool lots 	Transit Agencies, ODOT	Local Jurisdictions
<i>Transportation Management and Employer-Based Strategies</i>		
<ul style="list-style-type: none"> Alternate Work Schedule and Telecommute 	Employers	TMA, Metro
<ul style="list-style-type: none"> Carshare 	Employers	TMA, Metro
<ul style="list-style-type: none"> Guaranteed Ride Home 	Employers	TMA, Metro
<ul style="list-style-type: none"> HOV Lane 	ODOT	Metro, Local Jurisdictions
<ul style="list-style-type: none"> Rideshare 	Employers	TMA, Metro
<ul style="list-style-type: none"> Shuttle Service 	Employers	TMA, Metro
<ul style="list-style-type: none"> Marketing and Promotion, including individualized marketing (e.g., TravelSmart™) 	Metro, TMA	Local Jurisdictions, Employers
<i>Bicycles and Pedestrians</i>		
<ul style="list-style-type: none"> Encouragement, Promotional and Individualized Marketing Programs (e.g. TravelSmart™) 	Metro Advocacy Groups	Local Jurisdictions, Employers,
<ul style="list-style-type: none"> End-of-Trip Facilities 	Employers, Local Jurisdictions	Metro, Transit Agencies
<ul style="list-style-type: none"> Free Bike and “Smart Bike” Programs 	Employers, Advocacy Groups	
<ul style="list-style-type: none"> Traffic Calming 	Local Jurisdictions	
<i>Pricing</i>		
<ul style="list-style-type: none"> Peak period pricing – lane or facility-based pricing 	Metro, ODOT	Local Jurisdictions
<ul style="list-style-type: none"> Mileage-based insurance 	Private Sector, State Legislature	Advocacy Groups
<ul style="list-style-type: none"> Mileage-based fees 	ODOT, Legislature	Advocacy Groups
<ul style="list-style-type: none"> Gas tax increase 	ODOT, Legislature	Advocacy Groups

Note: HOV lane is located in Transportation Management and Employer-Based strategies for lack of an appropriate category.

More detailed information about implementation of these strategies is included in Chapter 3.

Measuring Success

A primary recommendation of this study is for Metro to take the lead monitoring the region's progress in meeting modal targets both regionally and in specific portions of the region (e.g., centers and corridors). Processes for measuring success include the following:

- Continue to use the regional travel model to assess current and projected future progress in achieving modal targets. Assumptions about the impact of specific strategies should be refined based on the results of this study.
- Use the upcoming revised travel behavior survey as an opportunity to gather additional information about the potential effects of strategies to achieve modal targets. Use the results of the survey to further update the model. Possible additional survey questions are listed in Chapter 3, Section 4.



- Work with local jurisdictions to create and maintain a region-wide database of bicycle (and pedestrian) user counts, provide guidance on the methodologies, help organize or provide PSU students or interns to carry out these counts, and track the progress over time. The cost of data collection will be an important factor in devising a system to create and maintain this database.
- Compile, coordinate and help evaluate local surveys or data related to the potential effectiveness of specific strategies as described in Chapter 3 this report. Help identify and catalogue transportation-related survey efforts undertaken in the region by Metro, TriMet, local jurisdictions and others.
- Continue to evaluate the success of employer-based strategies through the RTO program and in cooperation with employers, TMAs and local jurisdictions.

In addition to Metro's efforts to evaluate success on a regional or sub-regional level, we recommend that local jurisdictions, TriMet and others conduct surveys to assess the effectiveness of specific strategies in increasing non-SOV mode share. Examples could include the following:

- Vehicle and non-vehicle ridership (transit, bicycle and pedestrian) counts in areas where bicycle, pedestrian or transit improvements are implemented, both before and after completion.
- Surveys of residents or employees in areas served by improved facilities to assess impacts on travel behavior. Local jurisdictions and others should seek opportunities to use grant funding, interns and other low-cost techniques to gather and evaluate this information.
- Evaluation of data currently being collected (e.g., park-and-ride lot origin-destination data and ridership surveys) to assess the effectiveness of given strategies on mode share or VMT, where feasible.

These recommendations are discussed in more detail in relationship to individual strategies in Chapter 3.

Monitoring Compliance

A variety of procedures are recommended to monitor compliance with existing and new Metro requirements, including the following:

- Continue to review local TSPs using a refined checklist to ensure compliance with requirements for updating those plans.
- Continue to review comprehensive plans and development codes for compliance with Functional Plan requirements, including density and other land use and development targets for regional centers and corridors.
- Use the bicycle and pedestrian database described in the previous section to monitor progress in planning for and constructing bicycle and pedestrian improvements, and require each local jurisdiction to produce and regularly update bike/ped progress report outlining the effects to intersection nodes.
- Review annual reports prepared by the RTO program and DEQ related to ECO-rule compliance to assess progress in meeting those program goals; incorporate applicable results of these reports in RTP updates.
- Identify and track indicators related to transit system improvements, safe routes to school projects, elimination of employer subsidized parking, bicycle/pedestrian improvements and other strategies.
- Review and report on efforts by local jurisdictions and others to track progress in implementing optional strategies to meet modal targets, including before and after surveys, bicycle, pedestrian and other traffic counts, park-and-ride usage and related mode split data, and others (see Chapter 3 for more detailed information).

Updating the RTP

The following types of Plan amendments are recommended for consideration in the upcoming RTP update process.

- Amend Chapter 1 to add or refine policies related to suggested new minimum RTP requirements.
- Revise descriptions of transportation elements in Chapter 1 to incorporate information in this report related to park-and-ride lots, bicycle and pedestrian system, traffic calming, transportation management and parking.
- Update modal requirements sections of Chapter 6 to incorporate the following recommendations of this report:
 - Suggested changes to existing requirements for TMAs and Fareless Areas (pending a discussion of these elements during the RTP update process).
 - Potential new minimum mode share target requirements.
 - Expanded and reorganized description of secondary, optional strategies.
 - New procedures for measuring impacts of required strategies on mode share.
 - Proposed procedures for monitoring compliance with existing and new minimum strategies.

- Summary information from Appendices 1.8 and 2.2 related to the relationship between modal targets and RTP modeling assumptions and which types of assumptions are included in the model.

These amendments are described in more detail in Chapter 3.

Chapter 1. Objectives, Background and Methodology

Project Objectives

The overall objective of this project was to identify strategies and procedures to more effectively meet modal targets, measure progress in achieving them, and monitor local government compliance in doing so. Other goals included the following:

- Identify research documenting effectiveness of specific strategies in reducing single-occupancy vehicle use or increasing use of other modes of travel, with an emphasis on quantitative measures of mode shift or share.
- Assess the progress of local governments in meeting current requirements, including efforts to measure effectiveness and/or monitor compliance.
- Consider implications of recommendations on local jurisdictions, including relative ease to implement or monitor the effectiveness of recommended strategies.
- Describe the relative applicability of specific strategies to different areas within the Portland region, with a focus on relative effectiveness in regional centers, town centers, corridors and other areas.
- Involve local jurisdictions and other transportation interests in formulating and refining conclusions and recommendations.

Background

Over the past decade, research and data indicate that the Portland region and other communities in Oregon have made progress in reducing SOV mode share. Two sources of data provide evidence of this – US Census data and data compiled by UrbanTrans for the Metro RTO program.

The US Census provides a glimpse into mode share trends through the Means of Transportation to Work data collected during the decennial census. Commute characteristics are based on the results of the long-form questionnaire distributed to roughly 1 in 6 households. While the Census provides high-quality data that is useful for comparison of trends over time, there are three primary limitations:

- 1) The commute data reflects work trips only. According to the National Household Transportation Survey of 1995 (and other sources), commute trips account for roughly 20% of all trips.
- 2) The surveys ask about the primary means of commuting. This will often overlook bicycling and walking trips, as these modes are often secondary means of transportation.
- 3) The surveys are collected in March and April. This is not a peak time for bicycling and walking trips, especially in the Pacific Northwest.

Even with these limitations, the US Census data provides meaningful data for the purpose of comparisons of mode share. In addition to comparisons over time, the Census data is useful for comparing different cities, counties, or neighborhoods (the Census provides data down to the Census Block Group level).

Table 3 provides a summary of work-commute mode shift from 1990 to 2000 for Portland, Beaverton, and a few other selected cities. As can be seen, drive-alone commuting decreased for these Oregon cities. At the same time, transit use increased. However, most cities experienced a



decline in the number of pedestrian commute trips, with the only exception being Beaverton. Also, Portland, Seattle, and San Francisco experienced relatively high increases in bicycle mode share. These three cities all invested in major bikeway improvements during the 1990s.

One explanation for the decrease in pedestrian and bicycle commuting in many places is that these cities experienced expanded physical growth, making it more conducive for driving. Another explanation is

that Portland, San Francisco, and Seattle have experienced increases in bicycle ridership due to immigration of bicycle commuters, demographic changes in the population, and cultural shifts with regards to the perception of bicycling. More detailed assessment of commute trends in a city can be obtained through analysis of smaller geographic areas (i.e. Summarizing mode share by census tracts or block groups).

Table 3: Mode Share Shift in Selected Cities, 1990 to 2000

Mode	Percent Mode Shift					
	Portland	Beaverton	Salem	Eugene	Seattle	San Francisco
Drove alone	-2.1%	-5.6%	-0.9%	-3.2%	-3.7%	5.2%
Carpooled	-7.7%	-2.6%	1.1%	13.7%	-5.4%	-6.1%
Public transportation	11.6%	68.8%	27.4%	42.5%	10.8%	-7.1%
Motorcycle	-59.3%	-67.3%	-70.3%	-53.2%	-20.0%	-20.5%
Bicycle	53.9%	-50.6%	-23.0%	-4.4%	25.7%	108.7%
Walked	-6.9%	32.9%	-14.9%	-10.9%	1.7%	-4.8%
Other means	23.2%	167.5%	8.4%	-1.4%	-18.8%	-9.1%
Worked at home	28.6%	12.5%	37.0%	16.7%	20.3%	22.2%

Source: US Census 1990, 2000, Summary File 3, Journey to Work, Ages 16 and over

Portland Metro Rideshare's 2005 *Market and Research Implementation Plan* gathered baseline research on commuter mode share for 16 employment focus areas identified in the 2040 RTP. Data for the employment areas was available for 1996, 2000 and/or 2002. Table 4 shows how commute mode share has changed in these areas from 1996 to 2000 to 2002. SOV mode share in the employment areas has decreased between 1996 and 2002 by an average of more than 7%. At the same time, transit mode share increased an average of 6% and carpool mode share increased by an average of 1%. Figure 1 illustrates the change in SOV commute mode share over time.

Table 4: Portland Metro Employment Areas Commute Mode Share, 1996 - 2002

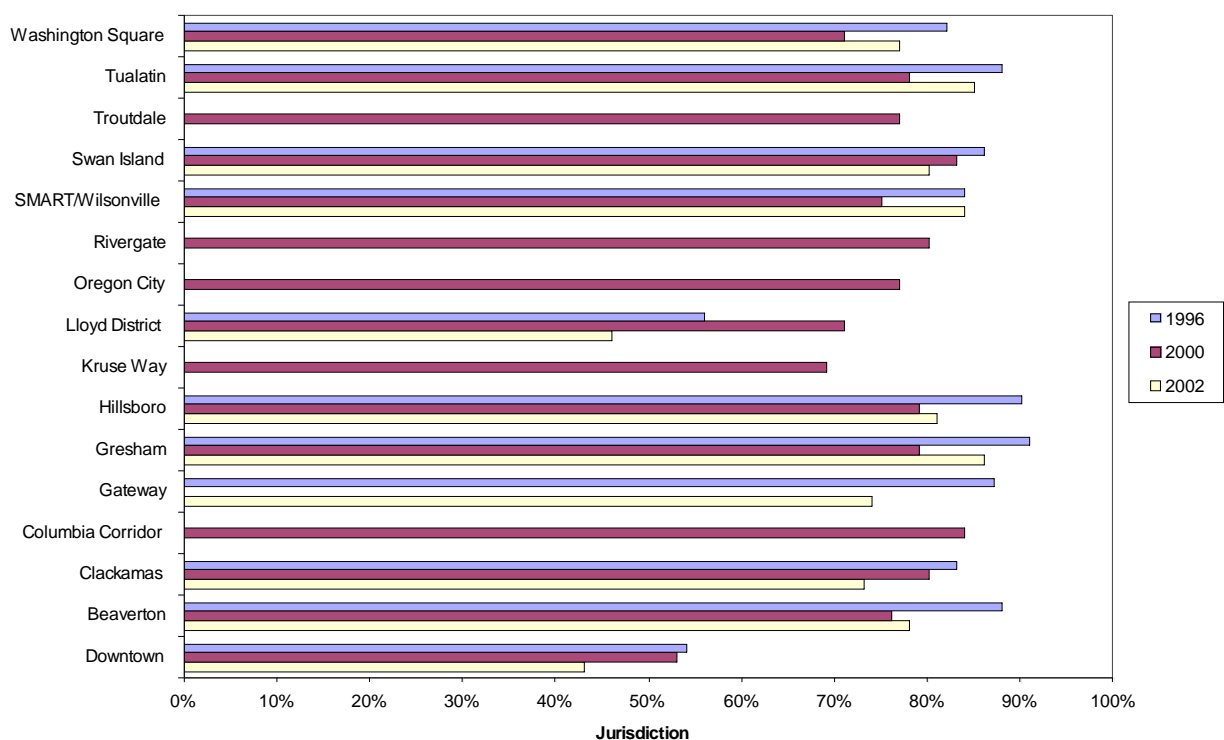
Employment Area	Mode Share								
	Single-Occupancy Vehicle			Transit			Carpool		
	1996	2000	2002	1996	2000	2002	1996	2000	2002
Downtown	54%	53%	43%	28%	27%	37%	13%	12%	14%
Beaverton	88%	76%	78%	4%	4%	10%	6%	11%	8%
Clackamas	83%	80%	73%	6%	3%	14%	6%	14%	7%
Columbia Corridor	NA	84%	NA	NA	2%	NA	NA	14%	NA
Gateway	87%	NA	74%	7%	NA	13%	5%	NA	8%
Gresham	91%	79%	86%	2%	3%	4%	4%	11%	7%
Hillsboro	90%	79%	81%	3%	4%	11%	6%	14%	5%
Kruse Way	NA	69%	NA	NA	6%	NA	NA	10%	NA
Lloyd District	56%	71%	46%	23%	12%	35%	14%	14%	11%
Oregon City	NA	77%	NA	NA	2%	NA	NA	10%	NA
Rivergate	NA	80%	NA	NA	4%	NA	NA	13%	NA
SMART/Wilsonville	84%	75%	84%	1%	1%	4%	9%	20%	8%
Swan Island	86%	83%	80%	3%	2%	4%	14%	15%	14%
Troutdale	NA	77%	NA	NA	1%	NA	NA	7%	NA
Tualatin	88%	78%	85%	1%	1%	3%	8%	17%	10%
Washington Square	82%	71%	77%	7%	4%	13%	7%	13%	8%

Source: Metro. Portland Metro Rideshare. Market Research and Implementation Plan: Parts A and B, April 2005.

Table 4 Note:

The mode share data source for 1996 and 2002 is the Oregon Department of Environmental Quality Eco Program. The mode share data source for 2000 is the 2000 U.S. Census. This may account for changes in mode share trends between 2000 and 2002.

Figure 1: Portland Metro Employment Areas SOV Commute Mode Share, 1996 - 2002



Source: Metro. Portland Metro Rideshare. Market Research and Implementation Plan: Parts A and B, April 2005.

Figure 1 Note:

The mode share data source for 1996 and 2002 is the Oregon Department of Environmental Quality Eco Program. The mode share data source for 2000 is the 2000 U.S. Census. This may account for SOV mode share increases between 2000 and 2002.

Methodology

In conducting this study, Metro staff and consulting team members conducted the following activities:

- Reviewed the following Metro documents and summarized their requirements related to modal targets:
 - RTP, with an emphasis on Chapter 6 and Appendices 1.8 and 2
 - Title 2 of the Metro Functional Plan
 - Street Connectivity: An Evaluation of Case Studies in the Portland Region
 - RTO Strategic Plan and Annual Report
- Met and communicated with Metro transportation and modeling staff to discuss Metro's procedures for monitoring compliance with the RTP and modal targets.
- Reviewed TSPs for six jurisdictions, including those for the cities of Portland, Wilsonville, Oregon City, Clackamas County, Gresham, and Beaverton.
- Conducted interviews with the same six jurisdictions to determine efforts to meet non-SOV mode share targets, their effectiveness, and any nexus between efforts and results.

- Reviewed local, national and international publications and case studies describing the effects of TDM measures in reducing SOV use or stimulating use of other modes of travel. Sources of written information included professional journals, Web sites, research organization publications (e.g., from the Transportation Research Board and Transportation Cooperative Research Program), and symposium and conference proceedings.
- Conducted follow-up interviews with academic researchers, local government staff, consultants and others.
- Communicated regularly with Metro and ODOT staff to assess progress, formulate next steps and review draft work products.
- Summarized the results of the research in this report and two technical memoranda.
- Conducted one meeting of a Project Oversight Committee (POC) and three workshops with a combination of the POC and TPAC representatives to review and refine work products.

Chapter 2. Existing Requirements and Current Efforts

This chapter provides a baseline “snapshot” of what representative local jurisdictions are doing to meet non-SOV mode share targets, and describes if and how the measures are being evaluated. For the purpose of this memo, TDM measures include all strategies that are being implemented to reduce SOV use and/or encourage non-SOV use. These include transit, bike, and pedestrian infrastructure improvements, land use strategies and encouragement programs.

The project team conducted the following activities to develop this memo:

- Reviewed the RTP, including appendices that identify modal targets and strategies local jurisdictions may use to meet them.
- Met with Metro staff at the outset of the project to discuss Metro’s procedures for monitoring compliance with the RTP and modal targets.
- Reviewed TSPs from six jurisdictions to provide a sampling of TDM activities being undertaken in the region. The six jurisdictions: Portland, Wilsonville, Oregon City, Clackamas County, Gresham, and Beaverton were selected to represent a balanced geographic distribution in the region as well as a range of size, land use, and population characteristics. Notes and policies from each jurisdiction’s TSP are included in Appendix A.
- Conducted interviews with these same jurisdictions to determine efforts to meet non-SOV mode share targets, their effectiveness, and any nexus between efforts and results.

Metro and Other Requirements to Reduce SOV Trips

Metro’s RTP is the blueprint that guides investment in the region’s transportation system for all forms of travel – motor vehicle, transit, bike, pedestrian and freight. The 20-year plan includes 2040 modal targets and specific actions to reduce the number of drive-alone trips as part of the region’s strategy to support the 2040 Growth Concept, provide travel options and decrease congestion and vehicle emissions. A basic construct of the 2040 Growth Concept is to reduce the region’s reliance on the automobile by focusing growth in centers and along major transportation corridors. It relies on a balanced transportation system that accommodates walking, bicycling, driving, transit and national and international goods movement. The RTP includes policies and projects to expand travel choices throughout the region, and encourage transit, walking, bicycling and carpooling.

Mode share targets are intended to be goals for cities and counties to work toward as they implement the 2040 Growth Concept and RTP at the local level. They also may serve as performance measures in Areas of Special Concern. Improvement in non-SOV mode share is used as the key regional measure for assessing transportation system performance in the central city, regional centers, town centers and station communities. For other 2040 design types, non-SOV mode share is used as an important factor in assessing transportation system performance. Modal targets are summarized in Table 5 below.

Table 5. 2040 Regional Non-SOV Modal Targets

<i>2040 Design Type</i>	<i>Non-SOV Modal Target</i>
Central city	60 – 70%
Regional centers	
Town centers	
Main streets	45 - 55%
Station communities	
Corridors	
Industrial areas	
Intermodal facilities	
Employment areas	40-45%
Inner neighborhoods	
Outer neighborhoods	
Note: The targets apply to trips <i>to, from and within</i> each 2040 Design Type. The targets reflect conditions appropriate for the year 2040 and are needed to comply with Oregon Transportation Planning Rule objectives to reduce reliance on single-occupancy vehicles.	

Section 6.4.6 of the RTP requires local governments to demonstrate progress toward the 2040 modal targets and to identify actions that will result in progress toward achieving the targets. A number of specific requirements for local TSP have been established. Section 6.4.6 of the RTP identifies specific actions jurisdictions must take to help achieve modal targets. Other potential actions/strategies are identified in Appendix 2 of the RTP that must be considered, and included as appropriate, as local transportation system plans and implementing ordinances. Minimum required actions and additional optional strategies are summarized in Table 6.

Table 6. Required and Optional Actions to Achieve RTP Modal Targets

<i>Minimum Required Actions</i>
1. Adoption of 2040 modal targets in TSP policies
2. Adoption of street connectivity plans and implementing ordinances
3. Adoption of maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan
4. Formation/existence of transportation management associations (TMA) as appropriate
5. Adoption of fareless area transit policies in regional centers
6. Adoption of transit strategies consistent with RTP Section 6.4.10, including planning for adequate transit facilities and service; pedestrian facility planning and infrastructure that supports transit use; location and design of buildings in transit zones that encourages transit use; and adoption of a transit system map, consistent with Metro requirements.

Additional Strategies to be Considered and Implemented, as Appropriate

1. Land Use Strategies
 - Mixed use/concept area and pedestrian district plans and implementing ordinances
 - Transit oriented development district plans and implementing ordinances

2. Shared Ride Strategies
 - Carpooling + matching services
 - Vanpooling
 - HOV Lanes
 - Preferential parking for Carpool/Vanpoolers

3. Non-SOV Mode Strategies
 - Bicycle facilities
 - Pedestrian facilities
 - Bicycle and pedestrian plans and projects
 - Transit:
 - Group/free transit passes
 - Express bus service / frequent bus service
 - Park-and-ride lots
 - Demand responsive transit service
 - Custom shuttle service (e.g., OHSU shuttle)
 - Bus bypass lanes
 - Projects to improve bike/ped access to transit
 - Carsharing
 - Alternative mode friendly street design

4. Parking Strategies
 - Parking pricing/parking meters
 - Timed parking
 - Subsidized parking structures in mixed use areas
 - Preferential parking for carpools/vanpools/bicycles
 - Shared Parking
 - Parking lot placement / building orientation

5. Employer-based strategies
 - Trip reduction ordinances
 - Compressed or staggered work schedules
 - Flex-time
 - Telecommuting/telework
 - Telecommunications (e.g., internet based strategies like video conferencing)
 - Guaranteed Ride Home program
 - Monetary Incentives (free or reduced transit passes, bike/walk certificates)
 - Participation in TMA
 - Vanpool operation/subsidy
 - Provision of on-site facilities supporting alternative modes, e.g. showers, bike parking
 - Preferential parking for carpools/vanpools/bicycles

6. Pricing Strategies
 - Congestion Pricing
 - Parking Pricing
 - Gas Tax Increase

-
- Vehicle Miles Traveled Tax
 - Vehicle Miles Traveled Insurance
-

In addition to Metro's requirements, local companies and agencies having more than 50 employees are required by the Oregon Department of Environmental Quality (DEQ) to implement Employee Commute Options (ECO) programs to reduce drive-alone commute trips. While many of the jurisdictions provide some technical support to help companies comply with the ECO rule, TMAs and TriMet provide most of the support for employers' trip reduction programs through Metro's RTO Program. Partner agencies include Metro, TriMet, SMART, C-TRAN, Oregon DEQ, ODOT, Oregon Office of Energy, Port of Portland, the cities of Portland and Gresham, and Clackamas, Multnomah and Washington counties.

During the past 10 years, the RTO program has focused on working with ECO employers to reduce drive-alone commute trips. The program evaluates itself annually to better understand and respond to changes in individual travel behavior. Included in the data are survey reports from each employment site subject to ECO rules, plus sites surveyed voluntarily (and with 50 or fewer employees). The program surveys employees about their travel behaviors to provide employers with appropriate strategies for increasing non-SOV use. Initial surveys also help identify baseline measures of mode share to be monitored over time. Additional annual surveys gauge the effects of programs and improvements and monitor progress towards the mode-shift goal for a particular employment site. The reports also identify other strategies that, if implemented, may help reduce drive-alone trips. Current data shows non-drive-alone trips to work have increased from 26 percent in 1996 to 31 percent in 2003.²

More recent travel behavior research indicates that most trips are not work related. The RTO program and subcommittee are taking a new direction to better address non-work-related trips through a newly envisioned collaborative marketing program. New survey tools will be developed that measure the impact of the RTO program marketing efforts on increased use of non-auto modes of transportation. New evaluation techniques identified through this project and future RTO program efforts also may help the region better measure progress toward achieving regional non-SOV modal targets as required by the RTP.

Metro Implementation Monitoring

The RTP places a number of very specific requirements on local TSPs as part of collective regional efforts to work toward meeting the modal targets. For requirements identified in the RTP, Metro's primary goal is to ensure that the planning programs are adopted, and that on-the-ground progress is demonstrated over time. Metro evaluates local progress toward achieving the non-SOV modal targets through periodic updates to the RTP. Progress toward the non-SOV modal targets is currently an output of the regional travel demand model, and cannot be generated easily by all local jurisdictions. Metro has incorporated measurements of the effect of some non-SOV modes into its transportation model. Appendix 1.8 of the RTP "Transportation Analysis Zone Assumptions for Parking Transit and Connectivity Factors," identifies specific modeling assumptions by transportation analysis zone that are intended to mirror the expected improvements and programs proposed in the RTP and their impact on mode choice. The model does a fairly good job of

² 2003 Regional Travel Options Program Evaluation Report, page 6.

incorporating connectivity, transit and parking strategies into the model, with measurable results. It is less accurate in assessing the effect of pedestrian, bicycle, and ride-sharing strategies.

Metro uses the modeling assumptions described in Appendix 1.8 as a checklist with which to review local TSPs, to ensure that the actions called for in the RTP are being implemented in local TSPs. In addition, Metro Code requires that an annual Urban Growth Management Functional Plan Compliance report be prepared that includes an accounting of compliance with each requirement of the Functional Plan by each city and county in the Metro region, including compliance with regional transportation policies and targets. As of December 2004, all local governments in the Metro region were found to be in compliance with Title 2 (Parking) provisions.

While many policies have been put in place through regional and local planning efforts, none of the policies have been fully implemented or measured.

Summary of Findings for Local Jurisdiction Efforts

Local Policies and Strategies

The policies and strategies in local TSPs set the framework for actions and initiatives to be pursued by jurisdiction staff and through implementation of local comprehensive plans and implementing ordinances. These include the adoption of modal targets, street connectivity provisions, and other code and policy measures. The TSPs of the jurisdictions sampled for this evaluation include these elements to varying degrees. Table 7 summarizes the findings from the TSPs with regards to implementation of TDM measures to meet the RTP modal targets provisions.

As indicated by review of TSPs and interviews with local jurisdiction staff, by and large, the policies and actions stated in the TSPs were being implemented by the jurisdictions. All jurisdictions have adopted modal targets based on Metro's targets by design type. All of them also have adopted development code language that sets parking ratios and provides incentives for "smart development" supportive of walking, bicycling and use of transit. In addition, all jurisdictions surveyed are actively working to improve conditions for bicycling, walking, and transit. Except for the City of Oregon City, all jurisdictions dedicate a section of their TSP to TDM.

Table 7. Summary of Major TDM Measures by Jurisdiction

TDM Measure	Portland	Beaverton	Gresham	Wilsonville	Oregon City	Clackamas County
Modal Targets (RTP)	●	●	●	●	●	●
Parking Management and Requirements (RTP)	●	●	●	●	●	●
Support of TMAs (RTP)	●	●	●	⊙	○	●
Roadway Connectivity Requirements (RTP)	●	●	●	●	⊙	●
Transit Pass Program in Regional Centers (RTP)	●	●	○	●	○	⊙
Other Transit Strategies	●	●	●	●	●	●
Neighborhood-based Travel	●	○	○	⊙	○	○

TDM Measure	Portland	Beaverton	Gresham	Wilsonville	Oregon City	Clackamas County
Management						
Development Incentives	●	●	●	●	○	⊙
Implementing Bicycle/Pedestrian Facilities	●	●	●	●	●	●
Carpool/ Match	●	○	●	●	○	●
Other	Carshare support	○	○	Shuttles	○	⊙

Sources of Data: City of Wilsonville TSP, Clackamas County TSP, Clackamas County Zoning Ordinance 1007.07, Clackamas County Comprehensive Plan, City of Gresham TSP, City of Portland TSP, City of Portland Comprehensive Plan, City of Beaverton TSP, City of Oregon City TSP, and telephone interviews with staff of respective jurisdictions.

Legend:

- Not in TSP or Codes
- ⊙ In TSP
- In TSP or Codes and currently implementing

While all jurisdictions surveyed are working to reduce drive-alone trips, the level of compliance and extent of effort varies among individual jurisdictions. Portland and Beaverton are fully in compliance, while the other jurisdictions have all adopted modal targets, parking requirements, and other strategies. While the Clackamas TSP was adopted prior to adoption of the 2000 RTP, and therefore does not have the required mode-shift strategies outlined in the RTP, Clackamas County has adopted roadway connectivity standards in their Comprehensive Plan and the Parking Maximums have been adopted in their updated Zoning Codes. For Oregon City, specific measures such as support for a TMA are not mentioned in the TSP. However, Oregon City is currently developing street connectivity standards. According to City staff, the standards should be adopted by 2006.

The larger jurisdictions (Portland and Beaverton) have more policies and measures in place to encourage walking, bicycling and transit use. In less dense areas such as Oregon City and Clackamas County, some strategies, such as use of parking meters, are not judged to be feasible due to lack of demand for on-street parking and the supply of nearby free off-street parking.

Based on interviews with jurisdiction staff, it appears that only Wilsonville works directly with employers to implement the ECO rule or trip reduction programs. However, all but Oregon City and Wilsonville have provided support to TMAs, which have more direct contact with large employers (Oregon City and Wilsonville do not have TMAs). By design, the agency support for the TMAs is intended to diminish as TMAs become self-sustaining through grants, partnerships, and business support. Also, while Clackamas, Portland, Beaverton, Wilsonville, and Gresham's TSPs include language about regional market-based strategies such as congestion pricing, no jurisdiction is actively pursuing this strategy, since its long-term effectiveness and political feasibility remain in question. However, Metro and ODOT are pursuing this tool on a regional basis and on specific projects funded through the RTP such as planning for Highway 217.

Measurement and Causality

Jurisdiction staff was asked about efforts to evaluate the effectiveness of the TDM measures. Of the six jurisdictions, only the Cities of Portland and Wilsonville are actively measuring the causal effects of a specific TDM initiative, using the TravelSmart™, employer programs based on development agreements and the Walk SMART program. Staff from the City of Beaverton questioned whether measurement and evaluation was actually Metro's responsibility. However, TMAs and employers have been measuring progress towards mode shift targets through employee-questionnaires as part of ECO-rule requirements. In addition, the City of Portland has been tracking bicycle use over time in the central city and other areas, and analyzing the correlation between bikeway facilities and bicycle demand, safety, and other factors.

As noted above, the City of Portland has been measuring before- and after- results of its neighborhood-based TravelSmart™ program. The TravelSmart™ program is a geographically focused program that provides customized assistance to households that wish to reduce their SOV driving. In this program, City staff (or contractors) interview targeted residents and identify barriers to non-SOV travel. The City then provides information and other “tools” for the household. A trip diary is then distributed to the household after the meetings with program staff to measure the effects of the assistance. The City of Portland also measures bicycle ridership through surveys and “tube” counts, but the causality of the measures has been difficult to isolate.

The TMAs and employers throughout the region are evaluating the aggregate effects of the ECO rule's trip reduction efforts on non-SOV commuting through surveys. The results of these efforts are reported annually as part of the RTO Program Annual Report produced by Metro. The nexus between specific actions and results are not being measured by these surveys. Typically, an employer will use an assortment of incentives to reduce SOV commuting, including transit pass discounts, end-of-trip facilities for bicyclists, or telecommuting encouragement. Based on conversations with transportation coordinators throughout the region, there are no specific measures that work across the board for employers. The efficacy of any given measure depends on land use, travel patterns of employees, type of employment, transit access, and a variety of other factors. In addition, while most surveys are oriented to changes in commuting behavior, work commuting accounts for only about one-quarter of all trips in the region. Finally, it was noted that, the effects of many strategies that are implemented locally must be measured regionally.



Conclusions

All of the jurisdictions surveyed are making efforts towards the reduction of SOV commuting through a variety of programs that encourage bicycle, pedestrian, transit and other non-SOV mode use. The obvious difficulty with evaluating TDM measures is that it can be difficult to determine the direct effect of a specific measure. Staff from the City of Wilsonville mentioned they were not working to evaluate specific strategies due to the questionable quality of data that would be obtained. Data obtained from surveys may not reflect actual activity and even if it does, the causality of specific measures may not be understood. As is the case with employer programs, each jurisdiction is implementing a number of different strategies to reduce drive-alone trips in order to

reach the desired mode share targets. In order to evaluate effectiveness, one or more of the following possible approaches may be used:

1. Identify research that provides quantitative evidence that specific strategies have measurable impacts and document the level of effectiveness of each in terms of modal shift; or
2. Isolate specific strategies and measurement techniques; establish control groups to statistically measure and monitor effects.
3. Improve the Metro model's ability to measure or predict the result of specific strategies or combinations of tools and continue to use the model to measure progress towards achieving modal targets.

Chapter 3. Strategies and Tools for Future Implementation

This chapter describes strategies intended to create a more balanced transportation system and meet RTP targets for non-SOV use. It includes an overview of the research and meeting process, an overview description of strategies researched for this study, and a summary observations and conclusions about the results of research conducted during this study. It then describes existing and future recommended strategies in detail. It also identifies other actions suggested to help achieve modal targets and measure success in meeting them. Finally, it details possible amendments to the RTP to implement the results of this study. The **recommendations section** is organized into the following five sub-sections.

Section 1 describes **strategies currently required by Metro**. Included are:

- Definition and intent.
- Documented effect on mode shift or share, including any quantitative data showing a direct link between implementation of the strategy and a shift in travel mode or reduction in miles traveled by car.
- Applicability to different Metro design types and areas within the metropolitan region.
- Best practices for implementation.
- Procedures used to measure effectiveness.
- Processes used or recommended to monitor compliance with Metro requirements.

Section 2 identifies **additional strategies recommended to be considered as part of a minimum “safe harbor” approach** during the RTP update process. This section includes the same type of information as described for strategies in Section 1.

Section 3 describes **secondary or supplemental strategies** that may be explored by local jurisdictions and others to help achieve modal targets. It includes information for each strategy similar to that in Sections 1 and 2, but in less detail.

Section 4 includes **additional recommendations for implementing strategies and monitoring their effectiveness**, as well as local jurisdictions’ or the region’s progress in implementing them.

Section 5 identifies specific **possible amendments to the RTP** to be considered during the upcoming RTP update process. These possible amendments should be considered very preliminary.

Strategies Researched

In researching different tools and their effectiveness, the consulting team reviewed a wide variety of literature regarding the following strategies:

Land Use

Strategies include:

- Connectivity
- Transportation-efficient development

These tools are intended to reduce travel distances, improve local traffic flow, facilitate access to transit and/or make walking and biking easier. Land use strategies typically are implemented through local development regulations and sometimes under the rubric of regional or state guidelines. Evidence suggests that land use strategies are effective in reducing single-occupancy vehicle (SOV) trips; especially local, non-work related trips. In addition, they have been shown to increase the percentage of walking trips overall and to improve access to transit.



Parking

Strategies include:

- Employer subsidies/priced parking/HOV parking
- Parking management and supply
- Timed Parking
- Shared parking

Parking strategies can be used to influence modal change or to utilize parking facilities and/or land more efficiently.

Strategies such as eliminating employer subsidies and parking maximums are some of the most effective strategies documented to reduce solo automobile trips. Others, such as timed and metered parking are primarily used to free up peak-period parking spaces, and are not as effective in reducing SOV trips. Shared parking, although identified in the RTP as a potential strategy, is not intended to reduce SOV travel and was not evaluated as part of this report.

Transit

Transit strategies incorporate a variety of methods intended to increase transit ridership by enhancing convenience, cost savings, accessibility and mobility. Strategies reviewed include the following:

- Bus service improvements
- Demand responsive/ADA service
- High frequency rapid transit (light rail and bus rapid transit)
- Park-and-ride or carpool facilities
- Site design accessibility
- Transit pricing

Convenience is often cited as the most important factor in the decision to shift from driving alone to other modes of travel. Therefore, the frequency of bus service and accessibility of transit services are critical to reducing SOV trips. The majority of transit strategies are appropriate for implementation by transit agencies in cooperation with local governments. The ease of implementation varies by strategy and situation, and in most cases requires local implementation of land use strategies and bike and pedestrian improvements to support access to transit.

Transportation Management and Employer-Based Strategies

These strategies include:

- Alternate work schedules and telecommuting
- Carshare

- Guaranteed Ride Home
- HOV lane¹
- Rideshare programs
- Shuttle service
- Transit marketing and promotion
- RTO Employer Outreach Program

These typically are implemented by employers, often with support and coordination from TMAs, which are non-profit organizations that provide transportation services in a particular area where commercial or employment activity is high. TMAs offer a variety of services to their members that individual businesses are not able to provide. These strategies are effective tools for reducing drive-alone trips by increasing access to transit. The RTO program at Metro also helps coordinate and support the use of these strategies.

The RTO is placing more of an emphasis on marketing efforts to promote these and other strategies that reduce single occupancy vehicle use. The RTO Employer Outreach Program works with employers in the region to help them develop successful TDM programs, primarily targeting the region's ECO-affected employers. There are approximately 50,000 employers in the region. In 2003, there were 580 employers participating in alternative mode programs marketed by TriMet. This includes more than one-third of all ECO-affected employers, along with 271 employers with 50 or fewer employees. In total, more than 143,000 employees benefit from TriMet's employer programs. While this represents solid market penetration and results in significant impacts, there still is tremendous market potential for reducing SOV trips through employers, particularly in regional centers.

Bicycle and Pedestrian Techniques

Strategies researched include:

- Bikeway & walkway infrastructure improvements
- Elimination of auto access (Car-free zones)
- End-of-trip facilities (bike parking, showers, changing rooms)
- Free bike and "smart bike" programs
- Outreach, encouragement, marketing, programs
- Safe Routes to School programs

These measures are intended to increase walking and cycling trips, as well as safety for current and potential users. Walkways, bikeways, and bike parking improvements are implemented at the local level, with some additional facilities provided by the regional and State government, depending on the jurisdictional responsibility (i.e., some shared use paths are spearheaded by Metro Open Spaces, and improvements on State highways are the responsibility of ODOT.) The *Oregon Bicycle and Pedestrian Plan (2005)* provides standards and guidelines for these facilities. Businesses or developers through local jurisdiction code language requirements typically provide end-of-trip facilities. However, many local jurisdictions install bicycle parking and/or provide incentives for their retrofit into existing buildings. Free bike and "smart bike" programs and other encouragement programs

¹ HOV lane is located in Transportation Management and Employer-Based Strategies for lack of a more appropriate category.

have been implemented by private organizations, public agencies, and public-private partnerships. Safe routes to school programs are organized by local jurisdictions with support from school districts.

Numerous studies and programs provide anecdotal findings with regards to the reduction of single-occupancy-vehicle driving and the encouragement of bicycling and walking trips. It should be noted that a lack of defensible research exists to show conclusive evidence of a correlation between bicycle and pedestrian strategies and increased pedestrian/bicycle mode share³. In part, this is because surveys allowing for the isolation of cause and effect are required to determine what precisely caused people to shift their travel behavior. While it is clear that bicycle and pedestrian enhancement strategies are encouraging more walking and bicycling trips in Portland, it appears that it is not any single strategy that should be employed, but a combination of multiple measures.

Many methodologies claim to predict potential bicycle and pedestrian use given various changes to the physical environment. These range from surveys (discrete choice models) to comparisons with similar facilities (comparison models) to estimates based on demographic and land use data (sketch plan models). However, none of these have been correlated to actual use over time as of yet.

Pricing

Strategies researched include:

- Congestion or value pricing – area-wide, facility-wide or partial facility / lane-based
- Mileage-based taxes and fees
- Mileage-based insurance

Pricing is a relatively new strategy in terms of implementation in the United States. Congestion pricing, also referred to as peak period pricing or value pricing, is intended mainly to reduce traffic and resulting congestion during peak hours with a goal or more effectively managing investment in transportation facilities which are designed to handle peak traffic flows. Reducing SOV travel, in part by shifting travel to other modes often is a beneficial secondary effect. The most comprehensive congestion pricing programs have been implemented in Asia and Europe with varying levels of measured success.

Mileage-based fees, taxes and insurance programs are intended to charge drivers the full cost of miles traveled and improve equity among all drivers in paying for driving-related costs. These strategies are typically implemented by state or national governments (fees and taxes) or the private sector (insurance policies), with the support or enabling legislation from states, national governments. Non-profit groups also can support these efforts.

Research and Project Process

The most relevant studies reviewed as part of this project are summarized and cited in this chapter and in Appendices B and C. Those studies included either quantitative data directly related to the effect of a given strategy on modal share or shift, or evidence of a direct (but un-quantified)

³ According to an article from British Medical Journal in September of 2004, "there's remarkably little evidence that measures like traffic calming and publicity campaigns have actually had this effect in practice [of increasing bicycling and walking trips]... (Oglive, 2004)." The study's authors screened 5606 references and assessed the full text of 399 documents in seven languages and found four instances of significant positive effect.

correlation between strategy and mode share or VMT. Numerous other documents were reviewed but are not cited directly if they do not show a direct link between implementation and effectiveness of a strategy in reducing SOV use. However, this report also includes a comprehensive bibliography of all information sources used.

The consulting team and Metro staff reviewed preliminary results of this research with the POC. At that time, the committee identified additional suggested research to be conducted or summarized, as well as a number of refinements to the memorandum summarizing the research. The POC also recommended further quantification of the estimated effects of selected strategies. The project team revised the (Task 3) memo to reflect these suggestions before providing it to members of TPAC for review and discussion at a subsequent workshop.

TPAC workshop participants similarly recommended reviewing a number of additional studies and raised a number of issues and concerns about the research and resulting recommendations. The research results and recommendations have been further augmented and refined for presentation in this report. Summaries of the POC meeting and TPAC workshop are found in Appendix D.

Summary of Key Findings, Observations and Conclusions

Summary observations include:

- It is very difficult to quantify the direct effect of any individual strategy on mode share and few studies have isolated and attributed changes in mode share to specific tools. For a limited number of strategies there are multiple studies that document quantitative relationships between implementation of a given strategy and mode share (e.g., parking pricing). In other cases, new strategies (Safe Routes To School and TravelSmart™) appear to have positive impacts, but long term effects are not yet known. In still other instances, no studies were found documenting quantitative impacts (e.g., pedestrian improvements) or quantitative information was available on changes in ridership or VMT related to a given strategy but such changes could not directly be converted to mode share with any degree of confidence (e.g., for park-and-ride lots). While a major goal of this study was to document quantitative impacts of individual strategies, the goal of direct, documented relationships proved elusive.
- Although a limited number of studies document quantitative relationships of cause and effect, a significant amount of anecdotal research shows that the non-SOV strategies required or recommended by Metro are effective at reducing SOV mode share. In general, it is difficult to determine exactly how effective a given tool is in increasing non-SOV mode share on its own. Gauging relative effectiveness of individual measures, including conditions under which specific strategies are likely to have the most impact, however, is more feasible. As a result, the research findings are useful in recommending strategies for further exploration, implementation and monitoring.
- Individual strategies are more effective when used in combination. For example, a robust system of bicycle and pedestrian facilities is a prerequisite for encouraging and increasing use of these modes of travel. Similarly, a well-connected street system with bike and pedestrian facilities is essential for increasing transit use, as is frequent and comprehensive transit service.
- Different strategies and combinations of strategies are expected to be more or less effective in different parts of the region. Factors such as density of development (both residential and employment density), access to transit, level of connectivity, proximity to major employment centers, and other conditions will affect potential effectiveness. This report identifies relative

applicability in different parts of the region, with a focus on potential effectiveness in centers and corridors vs. other areas.

- Many of the strategies required and being implemented by local jurisdictions (e.g., connectivity, comprehensive transit service, transportation-efficient development, parking management, etc.) are critical elements of a balanced transportation system. It is recommended that these strategies continue to be required and implemented. However, the effectiveness of these strategies, particularly in newly developed or developing areas, will need to be measured over a long period of time. Continued monitoring and measurement, including through use of Metro's regional travel surveys and travel demand model, is essential to gauge long-term effectiveness.
- In addition to the strategies required by Metro, several new strategies should be considered as possible future minimum requirements in the RTP. These include bicycle and pedestrian improvements, expanded use of parking pricing or parking cash-out programs, individualized or other marketing programs, employer-based TDM strategies and support for and coordination of Safe Routes to School programs and projects. These strategies either have strong potential for impacting mode share based on documented evidence, are already being implemented by local jurisdictions based on state or federal requirements (e.g., bicycle facility improvements), or can be implemented on a regional basis by Metro using state or federal grant money.
- Metro should have primary responsibility for measuring the effects of strategies individually or collectively through its travel survey, travel demand model, an updated regional travel behavior survey, or other means. At the same time, local jurisdictions and other should be encouraged to do a better job of measuring the potential impacts of individual strategies or projects using such methods as user surveys; ridership, vehicle, bicycle or other counts (both before and after project implementation and over time at key locations and intervals); or by analyzing data already collected and compiled (e.g., park-and-ride origin-destination data and transit ridership surveys).



Table 8 summarizes the results of research described above and identifies strategies by the following categories:

- Existing minimum requirements
- Suggested new minimum requirements
- Other strategies for exploration or implementation

The table represents a synthesis of a significant amount of information about a wide variety of strategies and related studies. More detailed information and explanation of study findings is described in subsequent sections of this chapter and in Appendix E.

Table 8. Summary of Research Results and Findings

Strategy	Quantitative Evidence (SOV)	U.S. Studies	Oregon Studies	Relative Ease of Implementation	Applicability (PDX Region)	Regional Applicability				Modal Share Impact
						Central City, Regional and Town Centers	Targeted Areas	Transit/Mixed-use Corridors	Other Urban Areas	
Land Use										
Connectivity	○	●	●	◐	●	✓	✓	✓	✓	1% - 2% VMT
Transportation-Efficient Development	●	●	●	◐	●	✓		✓		15% - 24% SOV ¹²
Parking										
Parking Pricing	●	●	●	●	●	✓	✓	✓	✓	2.5% - 5% SOV ¹² 20% SOV ¹ 5% - 35% SOV ¹
Parking Supply and Management	●	●	●	◐	◐	✓		✓		28% RDI ¹ ; 40% - 50% PKD
Timed Parking	●	●	○	●	●		✓			
Fare Free Area										
Fareless Area	●	●	●	◐	◐	✓				2% - 3% SOV
Transit										
Bus Service Improvements	◐	●	●	●	●	✓	✓	✓	✓	4% - 30% RDI
Demand Responsive / ADA Service	○	●	○	◐	●	✓	✓	✓	✓	40% wheelchair RDI
High Capacity Transit Service	◐	●	◐	◐	●	✓		✓		20% - 72% of new riders shifted mode from auto; 92% RDI over previous bus route
HOV Lane	◐	●	○	◐	◐			✓		Reduce vehicle trips 4% - 30%
Park-and-Ride/ Carpool Lots	●	●	●	◐	●				✓	40% - 60% SOV ²
Pricing and Fares	●	○	●	◐	○					18% SOV; 12% - 59% shift from auto
Site Design / Accessibility	●	●	○	◐	●	✓	✓	✓	✓	2% to 4.75% SOV ¹²
Transportation Management and Employer-Based Strategies										
Alternate Work Schedule and Telecommute	◐	●	○	●	●	✓	✓	✓	✓	Auto commute reduced 7% - 10% ⁹
Carshare	◐	●	●	◐	●	✓				47% VMT ¹⁰
Guaranteed Ride Home	○	●	○	◐	●				✓	N/A
Rideshare	○	●	○	◐	●	✓	✓	✓	✓	Represents 2% - 7% of commute

Strategy	Quantitative Evidence (SOV)	U.S. Studies	Oregon Studies	Relative Ease of Implementation	Applicability (PDX Region)	Regional Applicability				Modal Share Impact
						Central City, Regional and Town Centers	Targeted Areas	Transit/Mixed-use Corridors	Other Urban Areas	
										trips
Shuttle Service	--	--	--	--	--				✓	N/A
Marketing and Promotion	◐	●	●	●	●	✓	✓	✓	✓	21% RDI
Bicycle and Pedestrian										
Bikeway Improvements	◐	○	●	●	●	✓	✓	✓	✓	1 – 4% SOV; 100 – 150% Bike RDI ¹³
Elimination of Auto Access	--	--	--	--	--	✓				N/A
Encouragement, Promotional and Individualized Marketing Programs	◐	●	●	●	●	✓	✓	✓	✓	6% SOV; 12% VMT
End-of-Trip Facilities	●	●	●	◐	●	✓	✓	✓	✓	77% SOV ⁴
Free Bike and "Smart Bike" Programs	○	○	●	◐	◐		✓			N/A
Pedestrian Improvements ⁷	--	--	--	--	--	✓	✓	✓	✓	N/A
Safe Routes to School	●	●	○	●	●	✓	✓	✓	✓	13% SOV ¹¹
Traffic Calming	○	○	○	◐	◐	✓	✓	✓	✓	5% - 54% Ped/Bike RDI
Pricing										
Congestion Pricing	●	●	●	◐	◐	✓	✓	✓	✓	15% – 30% transit RDI; 1% - 3% SOV; 28% - 30% transit mode shift ³
Vehicle Miles Traveled Tax	○	○	○	○	○	✓	✓	✓	✓	13% VMT ⁵
Vehicle Miles Traveled Insurance	○	●	○	◐	◐	--	--	--	--	13% VMT ⁶

Evidence of Mode Share Impact

-- = No evidence

● = Direct evidence of impact on SOV use or mode share

◐ = Anecdotal relationship, including quantitative evidence of change in VMT

○ = Indirect relationship based on anecdotal evidence

Examples and Data Availability

● = Yes

○ = No

Implementation and Applicability

● = High (easy to implement or very applicable)

◐ = Moderate

○ = Low (difficult to implement or relatively un-applicable)

Modal Share Impact

SOV = Single occupancy vehicle trips

VMT = Vehicle miles traveled

RDI = Ridership increase

PKD = Parking demand

Table 8 Notes

1. Applies to commuting trips only.
2. Applies only to percentage of people using park-and-ride lots who switched from SOV to carpool or transit use.
3. Some figures apply only to users of priced facilities.
4. Applies only to percentage of people using BikeCentral who switched from SOV to bicycle commute.
5. Extrapolated from modeling results.
6. Extrapolated from modeling results; applies only to mileage-based insurance policy-holders.
7. See connectivity for related effects, including quantitative measure of impacts.
8. Some studies used apply only to those surveyed who drove to work before they lived near transit.
9. Estimates based on modeling.
10. Applies only to participants in carsharing program.
11. Applies to participants in Safe Routes To School program.
12. Extrapolated from a study of this strategy's effects on SOV commute trips and assumes that commute trips make up 25% of all trips.
13. Studies reviewed for this effort indicate this range of impact. However, impacts can be even more significant over time. For example, bicycle ridership on some facilities in the Portland area has increased from about 200 to several thousand riders a day, an increase of several thousand percent.

Recommended Regional Requirements and Implementation

Section 1. Existing Minimum Regional Requirements

The RTP requires local jurisdictions to implement the following non-SOV strategies:

- Adopt 2040 modal targets in TSP policies
- Adopt street connectivity plans and implementing ordinances
- Adopt maximum parking ratios to implement the parking requirements of Title 2 of the Urban Growth Management Functional Plan
- Adopt transit strategies, including planning for adequate transit facilities and service; pedestrian facility planning and infrastructure that support transit use; location and design of buildings in transit zones that encourages transit use; and adoption of a transit system map, consistent with Metro requirements.
- Form and support transportation management associations (TMA) as appropriate
- Adopt fareless area transit policies in regional centers

Most of these tools have been or are being implemented at the local level in most communities in the region and are recommended to continue to be required as part of a minimum or safe harbor approach. The last two requirements – fareless areas and support for TMAs – are recommended to be revisited as minimum requirements during the RTP update process.

The following topics are discussed for each strategy:

- Description
- Documented effects on mode shift or share
- Applicability to different Metro design types and areas within the metropolitan region
- Best practices and recommendations for implementation and possible RTP requirements
- Procedures used to measure effectiveness
- Processes used or recommended to monitor compliance with Metro requirements



Low Connectivity

CONNECTIVITY

Description

Connectivity refers to the number and directness of connections in a road or path network. Its intent is to reduce traffic congestion on major streets and enhance bicycle and pedestrian travel and access to transit. Good connectivity exists where there is a high number of intersections, short blocks and few dead end roads. It refers to areas with multiple points of access around their perimeter as well as a dense system of parallel routes and cross connections within the area.

Documented Effects

High connectivity can increase walking and biking trips. There are no studies that measure the direct impact connectivity has on decreasing single-occupancy vehicle (SOV) trips. However, studies show that it can reduce VMT by an average of 1% to 2% (Portland Metro, 2004). Other studies have shown a higher share of alternative mode use in neighborhoods with better connectivity, but without consistent quantitative results.

Implementation and Applicability in the Metro Region

This strategy is appropriate for implementation by local jurisdictions and developers throughout the region. Connectivity is most effective when used to improve areas with low connectivity such as undeveloped land and areas with the potential for redevelopment. Increases from low to moderate connectivity have been shown to be more cost-efficient than increases from moderate to high connectivity (Portland Metro, 2004). It is most easily implemented by regulating new development through local street plans. Transforming existing developments with low connectivity into well-connected neighborhoods, while encouraged, is difficult, long-term and costly.



High Connectivity

Currently, local jurisdictions help improve connectivity by preparing connectivity plans for new areas per Metro requirements and identify important local street connection as part of transportation system plans. They also implement a number of other measures through development regulations related to block length, intersection spacing requirements, and other practices that improve connectivity. Connectivity requirements also support other strategies such as implementation of pedestrian and bikeway improvements and improving access to transit.

Local jurisdiction representatives have indicated that this strategy can be difficult and costly to implement in existing neighborhoods where it is expensive to acquire needed right-of-way for connectivity improvements and such projects often are opposed by area residents. In these cases, jurisdictions should be encouraged to create connections for bicycles and pedestrians if full street connections are not feasible.

Measuring Impacts

As mentioned earlier, connectivity can be measured by counting the number of intersections per mile in a given jurisdiction. A moderate level of connectivity is defined by Metro as between 10 and 16 connections per mile. However, this effect can be estimated by using models or surveys to compare mode of travel for neighborhoods with high, moderate and low levels of connectivity. The impacts of connectivity on SOV use also potentially could be measured by comparing the results of Metro's travel behavior survey for participants in areas with varying connectivity if the sample size for that survey is large enough and locations with varying connectivity can be adequately defined.

Monitoring Implementation in the Metro Region

We recommend that Metro continue to monitor compliance with connectivity requirements through review of local connectivity plans as part of its checklist approach during review of TSPs and other planning efforts. These requirements include creating a future street plan map to be adopted into the local comprehensive plan and revising development code and design guidelines to meet regional goals for street connectivity in new residential and mixed-use development.

PARKING SUPPLY AND MANAGEMENT

Description

Parking supply is controlled in large part by local jurisdictions using zoning and building codes or ordinances which regulate the number allowed off-street parking spaces per housing unit or employee for different types of development. Instituting parking maximums and reducing parking minimums are two parking supply and management strategies that can be used to encourage modes of travel other than automobile.

Documented Effects

No studies have been able to isolate the effects of parking supply and management strategies on SOV mode share. Caps on parking spaces are believed to have increased transit mode share in downtown Portland, Oregon by 20%, although many other factors also may have contributed to this change. A study of parking maximums credited them with increasing transit share by 30 percent (K.T. Analytics, 1995) in some areas.

Implementation and Applicability in the Metro Region

Local jurisdictions can use zoning codes to implement parking minimums and maximums in conjunction with pricing techniques in downtown areas and along urban transportation corridors. Parking minimums can be lowered in conjunction with measures to increase alternative modes such as transit, walking and biking. Parking minimums are also effective in lower-density, suburban areas where supply often exceeds demand.

As with parking pricing strategies, we recommend that Metro encourage local jurisdictions to work with employers and parking facility owners to create a comprehensive parking management strategy. This strategy would impose parking minimums and maximums across large areas. In addition, we recommend that Metro work with or encourage the private sector, including lenders to incorporate reduced parking requirements as part of their land acquisition and development decisions.

Measuring Impacts

The effectiveness of parking supply and management can be measured using data from "before and after" surveys issued when new regulations are placed on parking. Parking space occupancy statistics also can be used to monitor the effectiveness of these policies.

Monitoring Implementation in the Metro Region

Recommended monitoring procedures include the following:

- Continue to review compliance as part of Metro's review of local TSPs and compliance with Functional Plan requirements.
- Periodically survey jurisdictions to assess the average number of parking spaces required and constructed associated with recent development (particularly large-scale developments); compile this information in a regional database that is maintained and updated regularly.

DEMAND RESPONSIVE / ADA SERVICES

Description

Demand responsive services are designed to enhance mobility by providing accessibility to transit for areas with low levels of transit services and individuals with special needs.

Documented Effects

No studies have examined the impact of demand responsive programs on SOV trips, but this strategy has proven to be effective in increasing new transit ridership generally and among specific populations. Studies on the effectiveness of ADA services have shown increased ridership among riders with disabilities on particular routes by 20 to 40 percent (Volinski, 1997; Navin, 1974; Pratt and Bevis, 1971).

Implementation and Applicability in the Metro Region

The RTP currently requires public transit agencies to consider the needs of people with special needs in providing transit service. This typically corresponds to providing services or facilities that meet ADA requirements and/or providing demand responsive service for populations that cannot access regular transit service. Demand responsive services are most appropriately implemented by transit agencies and/or local and regional jurisdictions. ADA services should be applied region-wide. Demand responsive service is most effective in suburban areas where transit service is lacking. One obstacle to implementation is the high cost involved in providing transit service to a limited number of riders.

Measuring Impacts

The impacts of demand responsive services can be measured using ridership counts and surveys.

Monitoring Implementation in the Metro Region

Similar to other bus service improvements, TriMet and Metro could cooperatively develop and use indicators to measure the successful implementation of this strategy, including average frequency of service, total ridership, rider surveys and other measures.

SITE DESIGN/ACCESSIBILITY

Description

Appropriate design of transit facilities can make transit more accessible for people with special needs and for pedestrians generally. Smooth walking surfaces and curb ramps are examples of site design practices oriented to people with special needs. Orientation and location of building entrances in close proximity to transit stops, connecting pathways linking transit facilities to adjacent commercial and high-density residential areas, and other design techniques can be used to improve access to transit services for all riders.

Documented Effects

One study showed that sensitively designed facilities in commercial centers correlated with 20% fewer solo office commutes than at comparable sites (Hooper, 1989). Other studies indicate that site design and accessibility can be expected to reduce SOV travel by 2 to 4.75 percent.

Implementation and Applicability in the Metro Region

The RTP currently requires local governments to undertake pedestrian facility planning and infrastructure that supports transit use and to require the location and design of buildings in transit zones to encourage transit use. In addition, accessibility requirements incorporated in state and local design codes require accessibility in public facilities and can be used to encourage their implementation by private developers and transit agencies. As noted in Chapter 2, most jurisdictions are implementing these existing Metro requirements. It is recommended that Metro retain and require implementation of these elements of the RTP. This strategy can be applied and be effective anywhere in the region but are likely to be most effective and efficient in dense urban areas and employment centers (e.g., Metro centers and transit/mixed use corridors).

Measuring Impacts

The effects of this strategy can be measured using counts of transit use and pedestrian activity from before and after site development or renovation. Surveys of building users also could be undertaken to estimate the effects of specific projects on transit and pedestrian use. Results of these surveys and other case studies identified during research for this project could in turn be used to estimate effects of this strategy on an area-wide basis for Metro centers, corridors or other areas where applied.

Monitoring Implementation in the Metro Region

As part of its checklist process, Metro can continue to monitor TSPs and development codes to ensure that local governments are meeting this requirement.

Section 2. Additional Minimum Regional Requirements

The following strategies are recommended to be considered as additional minimum or “safe harbor” requirements during the next RTP update process:

- Continue to require **transportation-efficient development** through efforts to meet density and other land use targets in centers and corridors as part of compliance with Metro Functional Plan and related requirements.
- Construct **bicycle and pedestrian improvements**, consistent with state, federal and local government requirements. Local governments and Metro should prioritize improvements that enhance connectivity of the bicycle and pedestrian system and access to transit.
- Continue to support TriMet and other transit agencies in providing **frequent, reliable and comprehensive transit service**, and local implementation of pedestrian and bicycle infrastructure to improve access to transit. Credit local jurisdictions with efforts to support transit agencies in these efforts.
- Support and encourage efforts to implement **employer-based TDM strategies**. Coordinate with employers even in areas where the formation of TMAs is not required.
- Encourage and assist in implementing **parking cash-out** programs or other techniques to **eliminate employer subsidies for parking**. Consider requiring local governments to eliminate

free employee parking and provide informational materials and technical assistance to employers interested in implementing such programs.

- Support and coordinate **Safe Routes to School** programs and projects. Local jurisdictions and Metro should support and help coordinate these efforts through project funding and technical assistance.

Several of these tools already are being implemented in many communities in the region. Others show significant promise for helping achieve modal targets and can be implemented without undue expenditures of resources by local governments. These techniques are recommended as minimum or safe harbor requirements to credit or encourage local governments to continue doing things they already do and/or to implement strategies with a strong likelihood of meeting modal targets.

TRANSPORTATION-EFFICIENT DEVELOPMENT AND LOCATION EFFICIENT MORTGAGES

Description

Transportation-efficient development (TED) is comprised of dense residential and commercial development in locations along transit lines and near neighborhood amenities. TEDs attempt to reduce automobile travel by increasing the accessibility of transportation options, such as public transit. TEDs promote cycling and walking through adequate pedestrian and bike facilities, traffic calming features and pedestrian-friendly streets. They often include a higher density mix of uses such as shops, schools, public services and a variety of housing types.



Location efficient mortgages (LEM) support TEDs by rewarding households that choose to live in more accessible locations. LEMs increase the amount of money homebuyers in urban areas are able to borrow by taking into account the money they save by living in neighborhoods where they walk or use transit to shop or commute to work rather than driving.

Documented Effects

Studies show that transportation-efficient developments encourage the use of public transit and typically reduce SOV trips between 15 percent and 24 percent. One study found that living in a traditional, urban neighborhood within a half-mile walking distance of rail or bus lines reduced drive-alone auto trips by 15 percent over a suburban style neighborhood without the same access to transit (Cervero and Radisch, 1995).

Implementation and Applicability in the Metro Region

Metro and local jurisdictions should continue to implement this strategy region-wide by meeting targets for densities and mixture of uses in centers and corridors, where this strategy is likely to be most effective. At the same time, Metro should continue to support provision of good transit service, bicycle and pedestrian facilities in these areas. Although this strategy can be most easily implemented in new areas, it also can be implemented with redevelopment of existing areas. Showing a commitment to transit service through implementation of light rail or frequent bus service is more effective in giving developers the confidence to invest and build near transit lines.

Location-efficient mortgages are not recommended as a minimum requirement because they are beyond Metro's scope of authority, cannot be implemented by local jurisdictions and there is little documentation of their effectiveness.

Measuring Impacts

This strategy's ability to reduce SOV trips can be estimated through the use of surveys. Metro may also be able to incorporate research results into its model to measure effectiveness of this strategy in centers and corridors, based on the results of this study and future case studies of the impacts of transportation-efficient development.

Monitoring Implementation in the Metro Region

Metro's travel model assumes that efficient land use and development in close proximity to frequent transit service will help reduce SOV mode share and VMT over time. Research has been shown this approach to be effective in several case studies conducted in the U.S. and is borne out by the high correlation between density and transit use in major metropolitan areas throughout the US and Europe. Compliance with Metro's Functional Plan requirements related to density and other land use targets should be cross-referenced with Metro's TSP checklist.

BIKEWAY IMPROVEMENTS

Description

Bikeway improvements include striped bicycle lanes, signed bike routes, and shared use paths. They also include improvements to intersections, such as signalization prioritization or favorable stop-sign orientation on "bicycle boulevards." A good bikeway network will include multiple types of facilities for riders of all skill levels. This includes striped bike lanes on arterials, bicycle boulevards on low-volume neighborhood streets, and shared use paths that provide direct connections to destinations free from automobile traffic. A good bikeway network will have few or no facility gaps or barriers at intersection crossings and along roadways.

Effects

A number of studies have determined that the provision of bikeway facilities, in particular on-street bicycle lanes, play a part in increasing bicycle use. Shared use paths tend to attract significant numbers of users, although impacts on mode share are not known. Although few cities track bicycle use by hand and automated tube counts, cities like Delft (Netherlands), Portland, San Francisco, and Seattle have experienced increased bicycle use associated with investments in bikeway facilities. All three of these U.S. cities have also found increasing mode share per census data. Based on a review of existing data, we estimate that bikeway improvements, in concert with other bicycle-related improvements, encouragement, and activities, can reduce SOV use by 1 - 4 percent.

Implementation and Applicability

This strategy is appropriate for implementation by local jurisdictions throughout the region. Oregon Revised Statute 366.514 (the "Bicycle Bill") mandates bicycle accommodation on new streets and streets undergoing substantial roadway improvements. Numerous national and local guidelines exist that provide guidance for appropriate facility selection based on the speed, volume, and other characteristics of the roadways. Implementation is easier in newer developments than in older areas where right-of-way may need to be acquired to accommodate bike lanes.

We recommend that Metro continue to encourage construction and regular maintenance of bicycle improvements in the region and keep a region-wide database tracking the total mileage of bikeway facilities in the region, based on data provided by the local jurisdictions as described above.

Although little research exists about the direct causality of bikeway improvements on mode share, an effective system of bicycle facilities is a prerequisite for cycling trips for most people and is needed to provide minimum accommodation to those wishing to bicycle. These improvements also increase the functional service areas of transit in the region, as many transit riders combine bicycling trips with their transit use. As noted earlier, most jurisdictions in the region are already meeting this requirement.

In identifying and constructing new or improved bicycle facilities, it also is important to work with the public, including neighborhood associations and citizens to identify needed bicycle and pedestrian connectivity improvements as part of transportation and land use planning processes. Identifying key improvements to major facilities that may have the greatest effect on bicycle use also is essential.

Measuring Impacts

Progress toward bikeway improvements can be measured in a literal sense by totaling up the mileage of each type of bikeway. The number of cyclists can be measured using hand, video, or tube counts, but this method will not allow jurisdictions to identify whether the cyclists are riding as a result of the improvements. Surveys that ask the questions about the motivations of cyclists are more useful in determining the effects of various improvements. Surveys in specific employment zones (such as the Lloyd District, Swan Island, and Westside TMAs) are particularly useful. As such, we recommend Metro continue to support TMA documentation of bicycle/pedestrian use. We also recommend Metro incorporate questions into the upcoming Metro travel activity survey to get at cause and effect in bicycle/pedestrian use.

However, in terms of tracking bicycling and pedestrian use, Metro's current land use models, although among the most sophisticated in the country, do not have the ability to project bicycle or pedestrian usage over time or tied to any specific land use. In part this is due to the lack of data. Thus, we recommend that Metro develop a region-wide database of bicycle (and pedestrian) user counts, provide guidance on the methodologies, help organize or provide PSU students or interns to carry out these counts, and track the progress over time. A proposed methodology for this is provided in Appendix C. In creating and maintaining this database, cities, counties, and even parks districts should identify numerous locations throughout their jurisdiction for regular counts. Ideal candidates would be streets and pathways that are near existing or proposed activity centers. Popular cycling routes also should be considered, such as arterials with bike lanes, bridges, or popular trails. Counts should be undertaken both in the summer months and other times of the year to ensure accurate average annual counts, and at least some of the locations should be counted annually to gauge success over time. The count recording methodology should be the same across jurisdictions. The cost of data collection will be an important factor in devising a system to create and maintain this database.

These efforts should be coordinated with an active national effort through the Institute of Traffic Engineers to develop a national database of bicycle and pedestrian counts, with the ultimate goal to develop a "trip generation manual" similar to ITE's manual that provides estimates of the number of auto trips generated by land uses. Metro will then be able to evaluate increases in bicycling and walking over time, across the region, and specific to land use and demographic conditions. This may help Metro being adjust land-use and travel forecasting models to better measure and predict bicycle and pedestrian activity.

Monitoring Implementation

The database of bicycle improvements and counts described above can be used in conjunction with other travel count data to monitor the mode share of bicycle use in selected locations throughout the Metro area. This information in turn can be used to monitor success in meeting the region's modal targets.

We also recommend requiring local jurisdictions to submit an annual report to Metro detailing efforts to implement TSP requirements on pedestrian and bicycle improvement implementation. This information can also be used in periodic updates to the Metro Bike There! Map.

PEDESTRIAN IMPROVEMENTS

Pedestrian activity also is affected by a variety of other strategies described in this report, including connectivity, transit-oriented design, transportation-efficient development and other tools that allow for or result in more walking trips. Although we were unable to identify any studies directly linking pedestrian improvements with changes in mode share, we did find a variety of studies that indicated relationships between these other strategies in modal shifts.

Description

Pedestrian improvements include sidewalks, crossing improvements (i.e. crosswalks, curb extensions, median islands), bridge improvements, intersection upgrades, and curb ramp installations. These strategies are important to increase pedestrian trips, but they also are important in providing access to transit. A good pedestrian environment would provide safe and comfortable walkways, clear of obstructions, and well-designed roadway crossings that minimize conflicts with automobiles.

Effects

Most research in this area has focused on safety improvement, with clear evidence that provision of sidewalks and intersection enhancements reduce the number of pedestrian-vehicle crashes. There is research that also suggests that the existence of sidewalks and direct pedestrian routes to destinations significantly increases the likelihood of walking trips (with consequent health benefits), even in suburban areas. However, additional empirical data regarding the impacts of sidewalks and other pedestrian amenities on mode choice is lacking. The specific effects on mode share are difficult to quantify.

Implementation and Applicability

Sidewalks, crosswalks, and other pedestrian features are appropriate throughout the region. Public policy supports the inclusion of sidewalks as part of street design in creating safe and accessible environments, as Oregon's Transportation Planning Rule requires the inclusion of sidewalks on most streets. Local jurisdictions are primarily responsible for implementing this strategy in concert with private developers. In addition, ODOT and Trimet have been working with jurisdictions to construct and improve pedestrian facilities on state roadways and around transit stops.

Pedestrian improvements are particularly important and likely to be more cost-effective in areas with strong potential for walking (e.g., higher-density and mixed use areas), in close proximity to schools (see Safe Routes to Schools section) and in the vicinity of transit facilities. The relative effectiveness of investments in pedestrian improvements are expected to be higher in town and regional centers, transit corridors and dense employment areas, in comparison to other parts of the region.

We recommend that Metro continue to encourage pedestrian improvements in the region. These improvements are necessary in providing minimum accommodation to those wishing to walk. These improvements also are of paramount importance to transit users in the region.

Measuring Impacts

Sidewalks and pedestrian facilities can be measured by evaluating the quantity and quality of walkways, conducting ADA⁴ curb ramp inventories, and conducting assessments of roadway crossings. The impacts of the improvements prove to be more difficult in monitoring, as there are no automated methods to accurately count pedestrian trips. Thus, the most effective and feasible method to measure impacts is through travel behavior surveys or travel logs. It is important to ask survey respondents the reasons why they choose to walk.

Similar to the recommendations for bicycle travel monitoring, we recommend establishing and regularly evaluating a region-wide pedestrian user count system, supporting TMA user surveys, and incorporating questions about pedestrian travel into Metro's travel behavior surveys.

Monitoring Implementation

Similar to the recommendations for bicycle facility tracking, we recommend tracking sidewalk mileage based on local jurisdiction information and evaluating progress in increasing pedestrian facilities. As in the bicycle section earlier, we also recommend requiring local jurisdictions to submit an annual report to Metro detailing efforts to implement TSP requirements on pedestrian and bicycle improvement implementation. This information can also be used to update Metro's regional sidewalk inventory on a periodic basis.

BUS SERVICE IMPROVEMENTS

Description

Improvements to bus frequency and routing can have a strong impact on transit use. Other important bus improvements include using low floor vehicles and adding bike racks. Recent interviews with transit riders cite the entire transit experience as important, including everything from the cleanliness of buses and bus shelters to the assurance of safe and reliable service.

Documented Effects

Although there is no research that documents the direct effect of bus service improvements on SOV travel, a number of studies on travel behavior show that current and potential transit users identify convenience as one of the most important reasons to use transit (TriMet, 2001). There also are studies that show a direct correlation between such improvements and increases in ridership. For example, an examination of rider counts in Boston showed an increase in ridership of about 28% after the City restructured routes to provide more direct service to a regional activity center (Weisbrod et al, 1982).

Implementation and Applicability in the Metro Region

Although expensive, increasing bus frequency and coverage are relatively straightforward strategies for transit agencies to implement in order to reduce solo automobile use. They are applicable throughout the region where ridership and transit demand warrant their use. The RTP calls for planning for adequate transit facilities and service and adoption of a transit system map in local TSPs, consistent with Metro requirements.

⁴ Americans with Disabilities Act

Metro's travel model assumes continued provision and improvement of transit service throughout the region. Local jurisdictions should support and receive a share of the credit (in terms of meeting modal targets) for efforts by TriMet and other transit providers to improve frequency and coverage of transit service. Improved frequency and coverage of transit service can have a direct impact on mode shift and is a prerequisite for many people who may consider shifting from single-occupancy auto use to other modes as a result of other strategies (e.g., parking pricing).

We recommend that the appropriate agencies look for ways to increase the frequency of transit service in areas with high demand and ensure that all new and existing transit facilities are accessible, clean and safe.

Measuring Impacts

Ridership counts, surveys and interviews are typically used to estimate the importance of bus frequency, coverage and other improvements on transit use. Measurements should be undertaken on a regular basis to ensure adequate service. Surveys of customer satisfaction should be used to evaluate a number of factors including bus frequency, reliability, safety and cleanliness. Existing information and future surveys should be evaluated with an eye toward impacts on non-SOV trips or additional transit trips as a percentage of all trips.

Monitoring Implementation in the Metro Region

Metro should work with TriMet and other transit agencies to develop new indicators or use existing criteria to monitor improvements in bus service. Indicators or criteria could include frequency of service for the system as a whole or high use bus routes, percentage of buses with bicycle racks, low floors or other specialized equipment, surveys of rider satisfaction (see above), to name a few. Metro could require or request annual reports on such indicators from transit agencies to help monitor progress in implementing this strategy.

PARKING PRICING

Description

Parking pricing encompasses a number of strategies that require motorists to pay for using parking facilities. Parking pricing strategies include:

Eliminating employer-subsidized parking

Employer provision of free parking to employees is often cited as an important reason why people to drive-alone. Likewise, eliminating these subsidies has a strong correlation with a shift away from SOV travel to other modes of transportation. Subsidies can be eliminated or altered in the form of a commuter allowance, available for use on transit or parking, or "cash-out" options, whereby commuters offered subsidized parking are also offered the cash equivalent if they use other modes of travel.

High occupancy vehicle (HOV) priority parking

Priority parking for high occupancy vehicles (HOV) usually takes the form of subsidies for HOVs while charging SOVs the full rate. A non-pricing HOV priority strategy would be providing parking spaces for HOVs at preferred locations, increasing convenience and security.

Metered parking

This strategy involves using meters to charge for on-street parking.

Documented Effects

The effectiveness of these parking strategies varies. Analysis of "before and after" surveys and parking occupancy data have been shown that pricing public parking can reduce solo driving by 25

percent (K.T. Analytics, 1995). Eliminating employer parking subsidies typically reduces SOV mode share by 2.5 to 5 percent, although one study claims a reduction in SOV trips by as much as 25% (Shoup, 1994). In another study, an employer parking subsidy for HOVs increased carpool use from 17 to 58 percent, while transit use declined 10 percent (Shoup, 1994a).

Metered parking, when implemented in isolation, has proven less effective. The City of Eugene, Oregon was successful in freeing up on street parking spaces by increasing parking rates and fines, but 95% of non-residents avoided increased costs by parking in nearby facilities or shortening their trips, rather than changing their mode of travel (Shoup, 1994b).

Implementation and Applicability in the Metro Region

Parking pricing strategies can be implemented and supported by local jurisdictions in conjunction with employers and/or owners of private parking facilities in a variety of ways and on a region-wide basis or in specific areas. While the documented effectiveness of this strategy is high, it cannot be feasibly implemented in all jurisdictions or areas of the Metro region. Economic conditions make it infeasible where alternative free parking is available and/or land costs or densities are low. Therefore, these strategies are most effective when instituted as part of a comprehensive plan that takes into account the supply of priced and free parking in dense urban areas, both on and off-street. Parking pricing strategies face obstacles other than the readily available parking alternatives.

One obstacle to implementation of this strategy is a lack of participation from owners of parking facilities and private employers. It may be difficult to convince some employers to eliminate the subsidies they use to attract employees. Another obstacle concerns HOV priority parking that targets commuters along urban fringes and transportation corridors. This strategy has been shown to increase carpool and vanpool use, but often attracts new users away from transit. On-street, or metered, parking is most often used as a parking solution rather than as a strategy to influence modal shift. Metered parking can be implemented in targeted areas to increase on street parking availability for residential and short-term use.



We recommend that Metro encourage local jurisdictions, TMAs and others (e.g. business associations) to work with employers and parking facility owners to create a comprehensive pricing strategy. This strategy would encourage employers to eliminate parking subsidies for their employees while ensuring that all on and off-street parking spaces in that jurisdiction are competitively priced.

In addition, Metro should consider the following actions as part of the next RTP update:

- Require public agencies above a certain size to eliminate parking subsidies and/or provide cashout alternatives for their employees.
- Require public and private parking facilities to reserve spaces or reduce fees for HOVs through municipal codes and Metro guidelines.
- Prepare informational materials promoting this strategy and targeted to employers in areas where this strategy is expected to be most effective; work with local jurisdictions, TMAs and others to disseminate these materials.

- Incorporate this strategy in marketing efforts expected to be undertaken by the RTO program as part of its regional marketing program to promote use of alternative travel modes.

These requirements likely would not be applicable in all jurisdictions but could be required in selected jurisdictions or sub-areas within the region.

Measuring Impacts

The effects of these strategies can be measured by analyzing mode of commute data obtained through “before and after” surveys. The surveys should be distributed when an employer is eliminating parking subsidies or new parking incentives are implemented for HOVs. In addition, Metro should use the results of survey methods, research obtained through this study and data gathered by the RTO program to refine assumptions in its regional travel model.

Monitoring Implementation in the Metro Region

Metro uses a parking cost factor in its modeling to approximate the effect of minimum and maximum parking ratios that are required by Title 2 of the Urban Growth Management Functional Plan. Most local jurisdictions have adopted the ratios in their plans and development codes. The RTP currently does not require local jurisdictions to implement pricing. Future monitoring of new requirements could entail the following:

- Incorporate review of this strategy in Metro’s TSP review procedures (checklist).
- Assess progress of local employers through data collected for the ECO and RTO programs; work with those programs to incorporate questions about use of this strategy in their monitoring efforts.
- Continue to refine the travel model and estimate current and future effects of pricing through the model.

SAFE ROUTES TO SCHOOL

Description

Safe Routes to School (SR2S) programs use a combination of infrastructure improvements (sidewalk infill, intersection enhancements, bike lanes, shared use paths, bike parking), education (training kids on bicycling and walking safety), enforcement (police presence), and encouragement. Effective programs make it easier and safer for children to walk or bike to school.

Effects

These programs have been growing in popularity all over the U.S. as well as throughout Europe. Based on preliminary studies of programs in Marin County, CA, and Boston, they appear to be effective in influencing travel mode choice. The Marin program has shown reductions in SOV trips associated with school commuting of 13 percent based on its programs. This would translate to a roughly 1-2 percent impact on the total number of trips, based on the relative proportion of school-related trips to all trips. The impacts on the overall traffic system would be more substantial since most school-related trips occur in the morning and evening peak travel periods. Long-term impacts of SR2S programs are not known due to the newness of the programs.

Implementation and Applicability

Safe routes to school programs are organized by local jurisdictions with support from school districts and private organizations, and are applicable throughout the region. Portland's SR2S program will begin in Fall 2005. Guidance is available through the Safe Routes to School coalition website, and through non-profit groups such as the Bicycle Transportation Alliance.

We recommend that Metro provide support and encourage jurisdictions or private organizations to implement Safe Routes to School programs. Metro also could adjust its MTIP funding evaluation criteria so that improvements to school areas would receive greater priority in future funding cycles.

In addition, we recommend that Metro create an umbrella database of safe routes to school activities, and include school sites within the bicycle/pedestrian user count database. This would be another excellent opportunity to involve PSU students or school-age students at the school sites themselves. Metro could help instigate selection of a handful of school sites in each jurisdiction, taking care to select a variety of demographic and land use types, for on-site annual tracking of school travel modes. Some of this can be done by coordinating with the schools' transit providers (if they exist.)

Measuring Impacts

The implementation of programs can be measured by evaluation of the number and quality of programs. The actual impacts can be measured through before- and after-counts of students that walk or bike to school and the number of "chauffeured" trips to and from the school. In addition, travel surveys should be distributed to students as well as parents to document mode choices and the reasons behind the choices. Since SR2S programs rely on a combination of strategies, it would be useful to know which strategies are most effective in influencing behavior.

Monitoring Implementation

To the extent Metro implements the recommendations above – to help fund and track safe routes to school projects – Metro also should monitor the success of these efforts, reporting regularly on the number of schools and estimated resulting number of trips that are affected. Metro may want to consider incorporating assumptions about safe routes to schools projects in its travel model to project regional effects on travel behavior and mode share.

Section 3. Other Possible Strategies to Achieve Modal Targets

The following strategies are recommended as additional tools which may be implemented by local jurisdictions or other entities to help achieve modal targets. These strategies are optional. They should be encouraged and where utilized, the effects should be documented. While they are expected to affect mode choice, they are not recommended as minimum requirements for one or more of the following reasons:

- Limited impact on modal share
- Relatively costly to implement
- Not applicable to all jurisdictions within the region
- Implemented primarily by the private sector, transit agencies, regional or state governments, or advocacy groups
- Difficult or impractical to measure impacts and monitor success on a regional basis

STRATEGY	PRIMARY IMPLEMENTATION ENTITY	SUPPORTING IMPLEMENTATION ENTITY
<i>Parking</i>		
<ul style="list-style-type: none"> Additional parking management and supply strategies 	Local Jurisdictions	Private Sector, Metro
<i>Transit</i>		
<ul style="list-style-type: none"> Bus service improvements 	Transit Agencies	Local Jurisdictions
<ul style="list-style-type: none"> High capacity transit (Light rail, streetcar and bus rapid transit) 	TriMet, Metro, Local Jurisdictions	Local Jurisdictions
<ul style="list-style-type: none"> Demand responsive / ADA service 	Transit Agencies, Metro	Employers
<ul style="list-style-type: none"> Marketing and promotion, including individualized marketing (e.g., TravelSmartTM) 	Transit Agencies	Local Jurisdictions, Employers
<ul style="list-style-type: none"> Park-and-ride and carpool lots 	TriMet, ODOT	Local Jurisdictions
<i>Transportation Management and Employer based strategies</i>		
<ul style="list-style-type: none"> Alternate Work Schedule and Telecommute 	Employers	TMA's, Metro
<ul style="list-style-type: none"> Carshare 	Employers	TMA's, Metro
<ul style="list-style-type: none"> Guaranteed Ride Home 	Employers	TMA's, Metro
<ul style="list-style-type: none"> Rideshare 	Employers	TMA's, Metro
<ul style="list-style-type: none"> Shuttle Service 	Employers	TMA's, Metro
<ul style="list-style-type: none"> Marketing and promotion, including individualized marketing (e.g., TravelSmartTM) 	Metro, TMA's	Local Jurisdictions, Employers
<ul style="list-style-type: none"> HOV Lane ⁵ 	ODOT	Metro, Local Jurisdictions
<i>Bicycles and Pedestrians</i>		
<ul style="list-style-type: none"> Encouragement, Promotional and Individualized Marketing Programs 	Metro, Advocacy Groups	Local Jurisdictions, Employers
<ul style="list-style-type: none"> End-of-Trip Facilities 	Employers, Local Jurisdictions	Metro, Transit Agencies, Advocacy Groups
<ul style="list-style-type: none"> Free Bike and "Smart Bike" Programs 	Employers, Advocacy Groups	
<ul style="list-style-type: none"> Traffic Calming 	Local Jurisdictions	
<i>Pricing</i>		
<ul style="list-style-type: none"> Peak period pricing – lane or facility-based pricing 	Metro, ODOT	Local Jurisdictions
<ul style="list-style-type: none"> Mileage-based insurance 	Private Sector, State Legislature	Advocacy Groups
<ul style="list-style-type: none"> Mileage-based fees 	ODOT, Legislature	Advocacy Groups
<ul style="list-style-type: none"> Gas tax increase 	ODOT, Legislature	Advocacy Groups

⁵ HOV lanes are placed in this section for lack of a more appropriate category.

TIMED PARKING (OTHER REQUIREMENT)

Description

Though not required, timed parking is another type of supply management technique and can be used to encourage alternative modes of travel by placing time limits on on-street parking spaces.

Documented Effects

Timed parking has not been found to have a strong impact on modal change. One peak-period demonstration aimed at reducing SOV commuting resulted in a 40 percent decrease in peak-period parking space occupancy, but only a small number of commuters changed transportation mode (Charles River Associates, 1984).

Implementation and Applicability in the Metro Region

Timed parking is designed to reduce peak-period and long-term parking, but can be minimally effective when implemented with other pricing and supply management strategies.

As with parking pricing strategies, we recommend that Metro encourage local jurisdictions to work with employers and parking facility owners to create a comprehensive parking management strategy. This strategy would use timed parking to control on-street parking in specific areas.

Measuring Impacts

Timed parking supply and management can be measured using parking space occupancy statistics. In addition, transportation surveys should include timed parking as an option for why people choose alternative forms of transportation for certain types of trips.

Monitoring Implementation in the Metro Region

Metro should track implementation of timed paid parking within and by local jurisdictions. This should be a relatively manageable and straightforward process, given that timed parking will be implemented gradually as market and other conditions allow.

HIGH-CAPACITY TRANSIT (HCT)

Description

High-capacity transit includes both Bus rapid transit (BRT) and light rail transit (LRT). HCT uses various techniques to provide frequent, fast and reliable service along transit corridors. BRT uses dedicated lanes, limited stops and improved bus stations to provide frequent bus service. LRT uses exclusive rights-of-way and well-designed transit stations to move passengers by train.



Documented Effects

Studies have used traffic counts and surveys to show that high frequency rapid transit is effective in attracting new ridership (TCRP, 2003).

No studies have been able to isolate the effects of light rail on SOV travel. The Transit Performance Monitoring System reports that more than half of transit passengers would travel by automobile without transit (FTA 2002). One recent study found that a 10 percent increase in a city's rail transit service results in a decrease of 40 annual VMT per

capita (Bento, et al, 2004). Portland's Interstate MAX Yellow Line carries 92 percent more people compared with the former Interstate Avenue bus line (Progressive Railroading, 2005).

Implementation and Applicability in the Metro Region

Both LRT and BRT can be difficult and costly to implement, due to construction costs and scarcity of land, but they also can be effective in increasing transit mode share and reducing automobile travel. HCT must be implemented through cooperation among local and regional governments, transit agencies, businesses and neighborhoods. These services are most effective when located in congested urban corridors.

We recommend that TriMet move forward with implementation of the Transit Investment Plan, and plans for the South Corridor I-205/Portland Mall Light Rail Project which will add 8.3 miles of light rail to the region's transit system. This project will also provide a new link from the Clackamas regional center to Portland State University through downtown Portland. Metro and TriMet should look to continue to expand the region's light rail system and consider the use of Bus Rapid Transit service in areas where light rail is not feasible.

Measuring Impacts

Measuring the impacts of HCT can be carried out using ridership and automobile counts before and after the implementation of BRT routes and LRT lines and can be supplemented using "before and after" surveys.

Monitoring Implementation in the Metro Region

Implementation of this strategy is relatively easy to monitor given the limited number and high visibility of projects, as well as TriMet and Metro's role in helping plan light rail projects.

PARK-AND-RIDE/CARPOOL FACILITIES AND HOV LANES

Description

Park-and-ride facilities include parking lots located along the urban fringe and higher occupancy vehicle (HOV) lanes reserved for use by carpools, vanpools and buses. Park-and-ride facilities allow suburban commuters to transfer from automobiles to higher occupancy modes of travel, such as carpools or transit. HOV lanes allow cars with multiple occupants to travel more quickly than SOVs.

Documented Effects

There is no research available that directly correlates the construction of park-and-ride facilities with mode shift. However, "before and after" surveys about mode choice reveal that, generally, 40 to 60 percent of park-and-ride lot users previously drove alone (Bowler et al, 1986). In addition, transit agencies such as TriMet often collect origin-destination surveys that could be used to estimate reductions in vehicle miles traveled by park-and-ride lot users. On average, HOV lanes can reduce vehicle trips anywhere from 4 to 30 percent (Cosmis, 1993 and Pratt, 1999).

Implementation and Applicability in the Metro Region

These facilities are coordinated and constructed by local and regional government and transportation agencies. HOV lanes typically are implemented by state highway departments. These facilities require adequate funding and land to be successful. Both strategies are effective along congested transportation corridors, while park-and-ride lots also are effective when located at the urban fringe and when accompanied by adequate service. Commuters often cite safety as a major concern when deciding whether or not to use park-and-ride facilities.

We recommend Metro, in partnership with local jurisdictions, help facilitate work by TriMet and ODOT to identify opportunities to increase the number of park-and-ride facilities for suburban commuters, including formal park-and-ride lots near major transit facilities and informal park-and-ride lots for carpools near state highways or other regional transportation corridors.

Measuring Impacts

The effectiveness of park-and-ride facilities is most often measured by surveying facility users. Before and after ridership counts can also be used to determine the impacts of park-and-ride lots. As noted above, origin-destination information can be used to estimate reductions in vehicle miles traveled of park-and-ride lot users.

Monitoring Implementation in the Metro Region

Metro could develop a database of park-and-ride lots, similar to that recommended for bicycle and pedestrian facilities in previous sections of this report. This database could be used to track the number of park-and-ride lots constructed, number of spaces developed, and resulting reductions in vehicle miles traveled. This information could be used to both monitor progress in building facilities and in reducing single-occupancy vehicle miles traveled, when coupled with data on total regional traffic volumes.

TRANSIT PRICING

Description

Changes in transit fees, such as fare reductions are usually implemented by providing free or discounted parking passes.

Documented Effects

“Before and after” surveys showed a 18 percent reduction in SOV trips due to reductions in transit fees over a period of two years (King County Metro, 1998; Koss, 1999).

Implementation and Applicability in the Metro Region

This strategy typically is implemented by regional governments or transit agencies. Despite some correlation between reduced transit fares and increased ridership, this strategy generally is not recommended for local jurisdictions as it depletes a source of revenue that can be used to improve the system.

Measuring Impacts

User surveys are the most effective means of measuring the effectiveness of this strategy, given the lack of existing data about the impact in other regions.

Monitoring Implementation in the Metro Region

Because this technique is not recommended as a minimum requirement, monitoring on a regional basis is not recommended.

ALTERNATE WORK SCHEDULES AND TELECOMMUTING

Description

Alternate work schedules include:

- Flextime - employees are allowed flexibility in their daily work schedules.
- Compressed work week – employees work fewer days, but still put in a full work week. One example would be working four 10-hour days instead of five 8-hour days.

A related strategy is telecommuting, substituting telecommunications for physical travel, allowing employees to work from home. These strategies are implemented by individual employers in an attempt to reduce costs and commute trips.

Documented Effects

No research has been conducted on the effects of alternate work schedules and telecommuting on SOV travel. These strategies have been shown to reduce peak-time commuting trips by 20 percent to 50 percent (Ewing, 1993). Without knowing whether this strategy affects SOV commute trips differently from other commuting trips, it is difficult to estimate the effect of this strategy on mode share.

Implementation and Applicability in the Metro Region

Local jurisdictions and Metro can play a supportive role, but these strategies are primarily implemented by individual employers. Metro also can encourage use of these strategies through marketing efforts and support for TMAs through the RTO program.

Measuring Impacts

The effects of this strategy can be instituted region-wide and measured using estimates based on local commute data or survey methods.

Monitoring Implementation in the Metro Region

Metro can monitor progress in implementing these strategies to some degree through the work of the RTO program, local TMAs and documentation prepared for compliance with the ECO program. This information can be compiled and assessed in updating the RTP.

CARSHARE

Description

Carsharing refers to automobile rental services that substitute for private vehicle ownership. Participants are charged for occasional use of a shared vehicle.

Documented Effects

Though no studies have been done to measure the effect of carsharing on solo automobile travel, these programs have been shown to reduce vehicle trips and miles of travel. Two-thirds of the participants in one carshare program avoided purchasing another car, resulting in VMT reduction of 47% (Cervero and Tsai, 2003).

Implementation and Applicability in the Metro Region

Carshare programs typically are implemented by cooperatives or private businesses. This strategy can be applied regionally but is more effective in dense areas (e.g., downtowns, town centers, regional centers, or dense residential areas) where cars can be placed within closer proximity to potential users.

While this strategy is not applicable for implementation by local jurisdictions, they can encourage the use of carshare programs and use shared vehicles instead of purchasing new city or county vehicles.

Measuring Impacts

The impacts of this strategy can be measured by surveying carshare members, reviewing information about the extent of use of carshare programs in terms of total and average miles driven per carshare user and comparing this information to total SOV travel within the region. While such information would be useful in identifying the impacts of carsharing, it also would be relatively time-consuming

and involve many analytical assumptions. Until use of car-sharing becomes more predominant in the region, tracking this information in a comprehensive manner is not recommended.

Monitoring Implementation in the Metro Region

Given that this strategy cannot be implemented by Metro or local jurisdictions and is not identified as a potential minimum required strategy for the RTP, no procedures are recommended for monitoring implementation.

GUARANTEED RIDE HOME

Description

Guaranteed Ride Home (GRH) programs provide people who commute by alternative modes with a ride home when needed due to work circumstances or an emergency.

Documented Effects

In one study, a survey of commuters showed that 59% of rideshare and transit users cited GRH as an important factor in their mode choice (K.T. Analytics, 1992).

Implementation and Applicability in the Metro Region

GHR trips generally are implemented by individual businesses with support from TMAs. This strategy is most effective in suburban areas where transit service is not as readily available. It should continue to be supported and encouraged by TMAs as a way to reduce auto trips. However, no other formal implementation actions are recommended.

Measuring Impacts

The impacts of this strategy can be measured by surveying employers and TMAs that offer the service and using data on how often the service is used to estimate reduction in SOV trips.

Monitoring Implementation in the Metro Region

Given that this strategy cannot be implemented by Metro or local jurisdictions and is not identified as a potential minimum required strategy for the RTP, no procedures are recommended for monitoring implementation. However, the RTO program and individual TMAs may monitor implementation of this strategy and document it in their annual reports.

RIDESHARE

Description

Rideshare, including carpooling and vanpooling, aims to provide access to employment centers or transit in low density areas, thus reducing SOVs.

Documented Effects

No data is available that documents the effects of rideshare programs on SOV trips. However, ridesharing has proven effective in increasing the average number of occupants per vehicle. Rideshare programs, along with other incentives, can reduce commute trips by 10 to 20 percent (Winters and Rudge).

Implementation and Applicability in the Metro Region

Rideshare programs can be applied region-wide and typically are implemented by a transit agency, privately or through a matching service, but can be supported by local jurisdictions. Rideshare programs appear to be most effective when implemented by large employers for employees who have relatively long commutes and regular commuting schedules.

TriMet currently operates six vanpool shuttles and two traditional vanpools. C-TRAN operates 10 vanpools. C-TRAN recently completed a market analysis to determine the potential for vanpools in their service area. Initial findings show that there is a considerably large, untapped vanpool market throughout the bi-state region, including areas that fall outside of the Metro urban growth boundary. In 2004, the vanpool program will be merged with the CarpoolMatch NW program to create the Regional Rideshare program. A 2005 market research and analysis study will provide recommendations on how to organize the rideshare program to better serve areas where carpools and vanpools can be most effective.

The RTO 2005 rideshare market research and analysis study will guide development of a Regional Rideshare Program. The study evaluated 15 employment centers in the region and will identify the most promising vanpool markets based on an analysis of current rideshare patterns.

Measuring Impacts

Trip count data can be analyzed to measure the effects of ridesharing. Data can be collected by TMAs and DEQ for monitoring compliance with the ECO rule. To measure the impacts on mode share and modal targets, surveys of riders also would be needed to verify what percentage of vanpool or carpool trips would otherwise have been made by SOVs (as opposed to transit or other modes). Collecting and evaluating this information on a regional basis likely would be challenging. However, it might be possible to use sample data to identify a rideshare factor that could be incorporated in Metro's regional travel model.

Monitoring Implementation in the Metro Region

The 2005 regional rideshare study will identify recommendations for monitoring and implementation in the Metro Region.

SHUTTLE SERVICE

Description

Shuttle services provide transportation in the form of vans or small buses in areas where regular transit service does not exist. Shuttles allow more people to use alternative transportation rather than a car.

Documented Effects

To date, no quantitative studies have analyzed the link between shuttle services and modal choice.

Implementation and Applicability in the Metro Region

This service can be implemented by individual businesses in suburban areas to improve access to transit for employees or by public agencies to increase mobility without the use of a car in activity and commercial centers.

Measuring Impacts

The impacts of this strategy can be measured by surveying employers and TMAs that offer the service and using data on how often the service is used to estimate reduction in SOV trips.

Monitoring Implementation in the Metro Region

Given that this strategy cannot be implemented by Metro or local jurisdictions and is not identified as a potential minimum required strategy for the RTP, no procedures are recommended for monitoring implementation. However, the RTO program and individual TMAs may monitor implementation of this strategy and document it in their annual reports.

MARKETING AND PROMOTION

Description

Transit marketing includes everything from mass-market information campaigns to targeted promotions. One particularly effective strategy incorporates Individualized Marketing Programs. The TravelSmart™ program, implemented by governmental or transit agencies, identifies individuals who want to change the way they travel and motivates them to consider a variety of travel options with information about how to use transit, bike paths, carpool services and other alternative modes.

Documented Effects

An analysis of travel diaries show that a pilot program implemented by the government of Western Australia achieved a 10 percent reduction in car travel and a 21 percent increase in transit use (Socialdata Australia Pty. Ltd, 2000). However, these reductions can only be applied to participants in the programs who had already identified a desire to make more frequent use of non-SOV modes. The impact of these programs on the general population has not been quantified.

Implementation and Applicability in the Metro Region

Local and regional jurisdictions and transit agencies use transit marketing and promotion to attract new ridership to transit. The City of Portland has conducted two TravelSmart™ pilot programs – one in the Hillsdale area and another in the Interstate MAX corridor. The City also is preparing to conduct a large-scale effort of a similar nature in the Interstate MAX corridor. Metro's RTO program currently is embarking on a regional marketing effort to encourage use of alternative modes of travel. Notwithstanding successful local examples in the City of Portland, TravelSmart™ programs are best applied at the regional level, because of the cost and staffing resources associated with this individualized marketing approach. Data collection is also a critical component of this program.

These programs are likely to be most successful in changing the behavior of people who have access to a full range of effective transportation alternatives (i.e., frequent, convenient transit service, bicycle and pedestrian facilities, etc.).

Measuring Impacts

We recommend that transit and other agencies attempt to measure the impact of this strategy through rider surveys and other means and periodically report the results to Metro. Questions that help assess effectiveness also could be incorporated into the travel behavior survey and RTO marketing efforts.

Monitoring Implementation in the Metro Region

Metro may be able to use the results of the reports and surveys identified above to monitor implementation of this strategy.

ELIMINATION OF AUTO ACCESS (CAR-FREE ZONES)

Description

Car-free zones, or areas that restrict auto use, directly reduce automobile use and increase bicycling and walking. According to the Car-Free Network, over 1,500 cities have participated in car-free days in 2004. These strategies range from one-time events in small sections of a city to permanent elimination of auto travel in large portions of an urban area.

Effects

Car-free programs that only apply over a small area or during limited time periods generally have modest, short-term impacts. They may simply shift vehicle traffic to other locations and times.

Larger scale Car-Free programs implemented in conjunction with other strategies may cause significant travel impacts if they make travel alternatives more attractive and help change overall travel habits. No long-term effects of car-free programs have been documented.

Implementation and Applicability

Car-Free areas tend to be most feasible and accepted in urban areas with good travel alternatives (transit, cycling and walking) and peripheral automobile parking. This strategy is particularly appropriate in high-density areas. However, it can be difficult to implement due to political resistance and opposition from businesses. Based on research in Bogotá and other cities, there have been no negative economic repercussions as a result of the car-free programs. According to Car Free Program staff at the United Nations, retail behaviors tend to shift to adapt to changes in automobile access.

We recommend that Metro encourage jurisdictions or private organizations to implement one-day car-free days in downtown areas. It would be most appropriate to organize this event in coordination with the World Car Free Day on September 22nd. These events would be most successful if they involve a broad group of participants including businesses, schools, non-profits, TriMet, and faith-based groups. The events would highlight the effects of SOV trips on downtown areas and could be used to inspire non-SOV travel behavior.

This technique could be used as an optional strategy by local governments on a more permanent basis, as desired to improve livability and to create walkable urban areas. However, it is not recommended as a regional strategy to achieve modal targets.

Measuring Impacts

Impacts of car-free zones can easily be measured in the affected area and with regards to the immediate short-term effects. However, travel surveys would be needed to measure the long-term effects of auto restrictions.

Monitoring Implementation

Monitoring implementation of this strategy is not recommended, given its limited impact on regional mode share.

END-OF-TRIP FACILITIES

Description

End-of-trip facilities include bike parking, showers, and changing rooms for cyclists. Bike parking improvements include short-term bike parking, long-term bike parking such as bicycle lockers or bike-lids, or secure bike storage rooms. They also may include bicycle repair facilities such BikeStation™ facilities that provide staffed valet-parking services.

Effects

Anecdotal evidence, as well as at least one study, suggests that bike racks attract users; before and after surveys of BikeStation™ and Bike Central (a Portland shower/locker/program) find that many users previously drove or took transit. Based on a 1997 survey conducted by Bike Central in Portland, 77 percent of users previously drove alone to work.



According to research conducted by BikeStation™ in Seattle, 30 percent of users previously drove alone to work. The impacts on overall mode shift on the general population are not known.

Implementation and Applicability in the Metro Region

This strategy is appropriate for implementation by local jurisdictions, TriMet, and developers throughout the region. Most local jurisdictions have codes that require minimum parking facilities for bicycles. Development incentives are used to encourage provision of bike parking facilities. Numerous national and local guidelines are available to encourage appropriate design and placement of bike parking facilities. In addition, public agencies may partner with private businesses to provide these services for commuters (such as with the Bike Central program).

Local jurisdictions should continue to implement this strategy through state guidelines and their own standards. In addition to encouragement, Metro should consider partnering with TriMet and a private organization such as BikeStation™ to develop a facility that serves regional bike commuters. No additional RTP requirements related to this strategy are recommended.

Measuring Impacts

The implementation of end-of-trip facilities can be measured by evaluating the quantity and types of facilities. The number of users of the facilities is also a good indicator of their function and value. As with most of the other strategies, the impacts of end-of-trip facilities on reducing SOV use can only be accurately evaluated through user surveys. Use also can be tracked by counting bicycles parked at bike racks and users of BikeStation-type facilities. This could be a component of the recommended bicycle/pedestrian annual report described in the bicycle improvements section, to the extent possible for government-funded projects. Most bicycle parking implementation occurs as part of private development and is not tracked. Setting up a database of privately-provided bicycle parking is not recommended.

Monitoring Implementation

As noted above, Metro could track implementation of this strategy through maintenance of a regional bicycle and pedestrian improvement database. Given that this strategy is not recommended as a minimum requirement, not additional monitoring is recommended.

FREE BIKE AND “SMART BIKE” PROGRAMS

Description

Numerous evolutions of free-bike programs have been implemented around the world, from the randomly-placed community bikes of Portland that suffered high rates of attrition, to the “Smart Bikes” of Europe which are used by visitors for a small deposit. In addition, there are programs in the United States and Europe whereby bicycles were strategically distributed to interested car commuters. The “Smart Bikes” are essentially automated bike rental kiosks that make it easier for visitors to rent bicycles for either sightseeing or for short trips. An effective program would provide pickup and drop-off sites at major visitor destinations. These programs require high levels of maintenance, which can be off-set by selling of advertising on the bikes or the kiosks.

Effects

European anecdotal evidence suggests that these programs have had a positive impact on bicycling, but U.S. cities have had little measured success in reducing SOV trips.

Implementation and Applicability

Due to the high-rates of attrition, the free bike programs would not be appropriate for implementation by public agencies. However, the “smart bike” programs may be implemented by

public agencies through a partnership with private businesses. Metro could encourage development of such programs. This program would be appropriate in areas with high numbers of visitors or tourists.

Measuring Impacts

The effect of implementation of “smart bike” programs can be measured by evaluating the quantity of bicycles made available through this program, coupled with assumptions about the number of trips used per bicycle per year, to identify total increase in or share of trips per year. The number of users of the facilities is also a good indicator of their function and value. As with most of the other strategies, the impacts of end-of-trip facilities on reducing SOV use can only be accurately evaluated through user surveys.

Monitoring Implementation

Monitoring implementation of this strategy is not recommended, given its limited impact on regional mode share.

OUTREACH, ENCOURAGEMENT, AND INDIVIDUALIZED MARKETING PROGRAMS

Description

Encouragement and promotional programs range from one-day events, to large-scale advertising campaigns, to individualized marketing programs such as TravelSmart™. The TravelSmart™ program is “a social marketing program that identifies individuals who want to change the way they travel, motivates them to think about their travel options and provides them with information about how to use transit, bike, walk or carpool for some of their trips.”

Effects

A wealth of anecdotal information based on counts and surveys of participants suggest these programs are having positive results. While many have not been in place for sufficient time to judge long-term results, a recent pilot TravelSmart™ program conducted in Portland showed a reduction in the share of drive-alone trips of approximately 10 percent for program participants. Programs in Australia have resulted in even higher mode shifts. However, the reduction in SOV trips is among willing participants in the program. The effect on the general population of the TravelSmart™ program or similar efforts is not yet known.

Implementation and Applicability

Transportation departments, public health agencies, non-profits, and private businesses are all implementing programs to encourage bicycling and walking trips. Local governments can initiate these programs with support from non-profit groups and foundation funding. Local government also can provide technical and financial support to organizations such as the Bicycle Transportation Alliance that are working to encourage cycling trips. Metro’s RTO program has recently shifted its focus towards a greater emphasis on regional marketing and will be pursuing such activities to promote non-SOV modes of travel.

Notwithstanding successful local examples in the City of Portland, TravelSmart™ programs are best applied at the regional level, because of the cost and staffing resources associated with this individualized marketing approach. We recommend that Metro continue to encourage non-SOV travel modes throughout the region through its RTO group and also work with local jurisdictions and schools on educational and encouragement campaigns. Metro can model its transportation efforts after its successful environmental and waste reduction campaigns.

Measuring Impacts

All of the encouragement and promotional programs can be measured through travel surveys. These surveys should be used to measure short-term changes as well as long-term travel behavior changes, and are a critical component of this program.

Monitoring Implementation

Metro should document its efforts and to the extent practical, the efforts of the private and non-profit sectors to encourage bicycle and pedestrian uses. Monitoring of the discrete effect on mode share is likely to be difficult and time-consuming, given the relatively level of impact and is not recommended.

TRAFFIC CALMING

Description

Traffic calming aims to reduce the “dominance and speed of motor vehicles.” It employs a variety of techniques to decrease vehicle speeds, either on a street or throughout a neighborhood. Tools include a variety of infrastructure improvements such as curb extensions, traffic circles, chicanes, raised crosswalks, and speed bumps. Successful traffic calming improvements contribute to the speed reduction of automobiles. Some traffic calming improvements also function to reduce “cut-through” traffic and restrict automobile access on neighborhood streets. Traffic calming features also can include non-transportation elements such as art, environmental remediation, and beautification.

Effects

While the main goal of traffic calming is to reduce automobile speeds, studies in England, Germany, and Japan found that bicycle and pedestrian trips increased as a result of the improvements. In the Japanese study, the increase in bicycle mode share was greater than the increase in pedestrian mode share. The exact effects of traffic calming on mode shift are difficult to quantify but may account for about a shift of approximately 1 percent from automobile use to bicycle and walking.

In the Portland area, local and collector street traffic calming projects have been extremely effective at decreasing speeds and improving livability and safety. These have included a whole range of features from speed bumps and mini traffic circles on local streets and collectors to traffic diversion on local streets. However, we do not have data to show an effect on non-SOV mode share. That said, traffic calming remains a popular tool to combat the harmful aspects of automobiles.

Implementation and Applicability

Traffic calming strategies are appropriate for implementation by local jurisdictions throughout the region. These strategies can be implemented relatively easily in both new and older neighborhoods, notwithstanding considerations of cost and public attitudes. Numerous guidelines exist to provide appropriate selection and design of facilities based on the roadway characteristics. To the extent they help increase walking and bicycling, they are likely to be most effective where they have the greatest potential to reduce speeds and increase safety. These factors can vary significantly throughout the region, making it difficult to predict where this strategy might be most effective.

We recommend that Metro continue to encourage traffic calming throughout the region. These improvements have multiple benefits on the aesthetics and livability of communities and the safety on roadways.

Measuring Impacts

The implementation of traffic calming can be measured by evaluating the quantity and quality of the projects. The effects of the traffic calming measures on reducing speeds can also be measured through before and after speed surveys. The number of bicyclists and pedestrians using the traffic-calmed streets can also be counted; at least some traffic calmed streets should be included in the bicycle/pedestrian count database. However, the counts would not necessarily reflect the number of new users since bicyclists who typically used another parallel route may be now using the traffic calmed route. Therefore, the effects on reducing SOV use can only be accurately evaluated through travel surveys.



Monitoring Implementation

The recommended annual report on bicycle and pedestrian facilities implementation could include information about implemented traffic calming projects.

CONGESTION OR VALUE PRICING

Description

Congestion pricing typically is applied in one of the following three ways:

- Area-wide pricing, where fees are charged all or many facilities within a region or by pricing facilities that provide entry to a region or area.
- Facility-wide pricing, where a fee is charged to use a given facility.
- Partial facility or lane pricing, where only some lanes of a given facility are priced.

In each case, higher tolls are typically charged during peak travel periods. In most cases, carpools and transit users are exempt from the toll or pay a lower fee to use the priced lanes or facilities. Single-occupancy vehicles typically pay a higher fee to use the priced lanes. Tolls can be collected manually (use of toll booths) or electronically, using transponders and over-head readers, along with an automated billing system.

Documented Effects

Area-wide pricing programs have been the most effective in reducing SOV use and shifting mode share or in shifting travel by time of day. The most successful program, first implemented in 1975, is in Singapore, where single-occupancy vehicle use in the central city dropped by over 20% and use of transit and four-person carpools increased by a corresponding amount. Programs in Norway, London and Germany resulted in mode shifts of 7 to 15 percent for priced areas. Modeling studies in the US indicated a potential mode shift or reduction in VMT of anywhere from 4 percent (Los Angeles) to 28 percent (Boston).

Facility-wide pricing has been implemented in Europe, Asia and the U.S., with varied results. Only Seoul, Korea's program has directly measured mode shift, with a significant decrease in SOV mode share (30 percent shift between SOVs and other modes). Shifts in mode share either have not been measured directly or achieved in other areas (France, New York/New Jersey and Florida). In most of these cases, the primary effect was to shift travel to non-peak periods (the main goal of the program), with little to no change in mode of travel.

Partial-facility or lane pricing has been implemented on two California freeways and one freeway in Texas. Effects on mode share for these facilities have been relatively small, although they have been

successful in shifting travel time and raising revenues for transit and other transportation improvements. In at least one case, average vehicle occupancy increased slightly.

Implementation and Applicability in the Metro Region

While congestion pricing has been very successful in some areas, implementation of a comprehensive system in this region will face a variety of challenges, including cost of implementation and concerns about equity, diversion to non-priced facilities and other factors. Metro conducted a pilot project to explore implementation of congestion pricing. That study recommended considering use of peak period pricing primarily on new lanes as part of improvements to major highways where capacity is being added. Lane and facility pricing currently are being studied as part of the Highway 217 corridor planning project and will be studied as part of other future corridor planning processes. Future implementation would be most appropriate at the regional or state level with coordination and cooperation of local jurisdictions.

Measuring Impacts

A combination of traffic counts and driver surveys can be used to help assess the impact of peak period pricing applied to a lane or facility. To accurately measure impacts, data should be collected for an entire corridor to capture information about impacts on parallel roads or other facilities. Data on travel by all modes in the subject corridor, both before and after implementation should be collected and updated periodically to assess longer term effects. Surveys of travelers in the subject corridor may be needed to isolate the impacts of pricing in comparison to other factors affecting travel behavior there.

Monitoring Implementation in the Metro Region

To the extent it implements this strategy, Metro should use the information described above to track progress in using peak period pricing and its success. This should be a fairly manageable process, given the relatively limited number of highway corridors where it may be applied in the future.

MILEAGE-BASED TAXES AND FEES

Description

Under this strategy, taxes or fees are converted to be assessed based on vehicle miles traveled with the goal of increasing the costs of driving, particularly for SOVs, in an effort to reduce miles traveled and indirectly increase the share of travel by other modes. Implementing this strategy would involve converting purchase price taxes, vehicle registration or vehicle lease fees to a mileage-based tax to be paid over time. Mileage based fees or taxes can be assessed through use of electronic equipment that measures mileage and converts it to an annual fee or tax. These strategies have been implemented or proposed in the Netherlands, Israel, the United Kingdom and the European Union. Recent legislation in Oregon directed the state legislature to explore the feasibility of a mileage-based gas tax or fee in this state.

Documented Effects

There is little available quantitative data showing the effect of existing mileage-based taxes or fees. The potential of effectiveness has been modeled for several cities in the US (Harvey and Deakin studies). These models and studies indicate that such fees and taxes have the potential to decrease VMT by about 2 percent to 15 percent, depending on the per mile fee or tax (ranging from 1 cent to 10 cents per mile). Modeling of two cents per mile emissions fee showed a reduction of 3.9 percent to 4.4 percent in several California communities. Effects have not been translated into direct effects on mode share. Analysis and reporting of effects in specific areas potentially could be done using a combination of data on miles traveled (collected by state agencies) and surveys of commuters in specific geographic locations to isolate the cause of the changes in miles traveled or mode split.

Implementation and Applicability in the Metro Region

Implementing this strategy would involve converting purchase price taxes, vehicle registration or vehicle lease fees to a mileage-based tax to be paid over time. Mileage based fees or taxes can be assessed through use of electronic equipment that measures mileage and converts it to an annual fee or tax. Mileage-based taxes or fees are not applicable for local jurisdictions as they would need to be implemented at a state or national level. This strategy is not appropriate or feasible for implementation by local jurisdictions. However, local jurisdictions, Metro and advocacy groups could encourage the state to implement this strategy.

Measuring Impacts

As noted above, the impact of this strategy potentially could be measured using a combination of data on miles traveled (collected by state agencies) and surveys of commuters in specific geographic locations to isolate the cause of the changes in miles traveled or mode split. This likely would be a costly undertaking, particularly if it were done at anything beyond a regional level (e.g., for regional centers, town centers or any other subarea within the region). Conducting a survey for the region and subareas would require a fairly large sample size.

Monitoring Implementation in the Metro Region

Given that this strategy cannot be implemented at the local level and is not recommended as a minimum requirement, no monitoring procedures are recommended.

MILEAGE-BASED INSURANCE

Description

The goal of this strategy is similar to that described for mileage-based fees and taxes. Under this strategy, a vehicle's insurance premiums are based directly on how much it is driven during the policy term. This can be done by changing how premiums are calculated from the vehicle-year to the vehicle-mile, vehicle-kilometer or vehicle-minute. The "Pay as You Drive" insurance strategy is being implemented in a variety of countries, including the United States, as well as Israel, Holland and the United Kingdom.

Documented Effects

The effects of the Progressive Insurance program as used in Houston Texas have been measured (Litman, 2001), indicating that variable insurance rates encouraged participants to reduce their mileage by 13 percent. No direct effects on single-occupancy vehicle use overall or mode share or shift have been documented. Modeling studies of the potential effect of mileage-based pricing indicate that a typical vehicle insurance fee of 6¢ per mile would reduce vehicle travel by 10% or more (Deakin and Harvey).

Implementation and Applicability in the Metro Region

Like mileage-based fees and taxes, this strategy would be implemented at a state or national level but via private insurance companies. Similarly, local jurisdictions, Metro and advocacy groups could encourage the state and/or private insurers to authorize and implement this strategy.

Measuring Impacts

Effects of this strategy would be assessed in a similar manner as mileage-based fees and taxes, as well as via surveys of participants. As with that strategy, monitoring effectiveness at the local and regional level likely would be relatively costly and challenging.

Monitoring Implementation in the Metro Region

Given that this strategy cannot be implemented at the local level and is not recommended as a minimum requirement, no monitoring procedures are recommended.

Section 4. Additional recommendations for implementation, measurement and monitoring

Sections 1 – 3 of this chapter described recommendations for Metro, local governments to implement the strategies discussed in this report. Those sections also identified procedures for measuring progress in measuring effectiveness and in monitoring progress towards implementing strategies. This section identifies additional such recommendations that are not necessarily oriented toward any one strategy.

Methods for determining local government compliance

In addition to the processes described previously in this chapter, the following procedures are recommended for use by Metro to monitor local government compliance in meeting recommended minimum or “safe harbor” requirements.

- Incorporate additional recommended requirements in Metro’s Local Compliance Plan Checklist, including the following possible changes or additions:
 - Under Policy 19.0, add language about supporting informational or marketing efforts to encourage people to use alternative modes of transportation, including bicycling, walking, transit, telecommuting, ridesharing and other modes of travel.
 - Under Policy 19.1, add language about supporting and encouraging employers to eliminate parking subsidies and free parking for employees as part of comprehensive parking management and pricing programs.
 - Under Alternative Modes Consistency Analysis, add items related to potential new minimum RTP requirements related to modal targets (e.g., achieving Functional Plan requirements for density and land use; encouraging employers to eliminate parking subsidies and free parking; requiring implementation of bicycle and pedestrian improvements per state and federal requirements and adopted TSPs; and coordination and implementation of efforts to facilitate Safe Routes to School.

Monitoring through regional model and periodic updates to the RTP

Metro currently uses its regional travel model to estimate current and future travel, including progress in meeting modal targets. One of the overall recommendations of this report is that Metro regularly update and refine the model to incorporate the results of this and other studies of the effects of different strategies on travel behavior. This can be done by updating model assumptions and related factors about the following:

- The impact of implementing connectivity, parking pricing and other minimum requirements. For example, depending on recommendations about future parking pricing, parking pricing factors could be applied to employment areas or other areas where they are not assumed now.
- Locations where different strategies may be applied and/or be most effective. Assumptions could be varied for current model elements based on results of research for this study.
- Which strategies will be implemented. For example, factors could be developed related to availability of bicycle facilities such as shared use paths and bike lanes, or other factors such as street connectivity, density, land use, trip distance, demographics, etc.

Travel behavior survey recommendations

Metro is preparing to update its travel behavior survey. In the past, this survey has been administered to approximately 7,500 households in the region and is used to compile detailed information about travel choices and behavior based on trip diaries that included information about all travel within a two-day period, including location, reasons for and means of travel. Rather than ask people directly about their preferences or reasons for choosing specific travel options, survey questions and results are used to evaluate the most likely factors guiding these choices based on a comparison of travel destinations and means with information about the adequacy of transportation options in different areas. The results of this analysis have been incorporated in Metro's regional travel model to predict how future policies, programs, facilities and services will affect travel throughout the region.

In updating and administering the travel survey, additional questions could be asked or more information could be gathered to help further determine the quantitative impact of strategies researched for this project. The following types of questions or topics are recommended to be considered for inclusion in the updated survey:

- Perceived availability of non-SOV travel options (when SOV trips are made or not made e.g., do they know about transit, bike and carpool options?)



- Factors guiding travel choices for different types of trips, particularly for non-SOV trips (e.g., what was the primary reason for using a non-SOV mode of travel if SOV use was an option)
- Length of time they have been using non-SOV modes of travel
- Exposure to transit or other marketing efforts (e.g., future marketing efforts conducted through the RTO program)
- Whether or not free parking is available

These questions will need to be carefully phrased, given that the travel behavior survey is not intended to be a stated preference survey, nor are such surveys Metro's preferred vehicle for evaluating information about or predicting future travel behavior.

Section 5. Possible RTP amendments needed to implement project recommendations

The following types of amendments to the RTP are suggested to implement the recommendations of this project:

- Amend Chapter 1 to add or refine policies related to suggested new minimum RTP requirements such as requirements for density and land use; encouraging employers to eliminate parking subsidies and free parking; requiring implementation of bicycle and pedestrian improvements per state and federal requirements and adopted TSPs; and coordination and implementation of efforts to facilitate employer-based TDM strategies and Safe Routes to School (see Section 4 of this Chapter for sample language).

- Revise descriptions of transportation elements in Chapter 1 to incorporate information in this report related to the following:
 - *Park-and-ride lots* – importance of monitoring use of park-and-ride lots and potential impact on VMT or mode share.
 - *Bicycle and pedestrian system* – potential of new facilities to increase bicycle mode share, relationship between transit, pedestrian and bicycle use, need to encourage and/or build bicycle parking and other end-of-trip facilities, and support for Safe Routes to School programs and projects.
 - *Traffic calming* – potential for traffic calming to increase bicycle and pedestrian travel.
 - *Transportation management* – information about regional and individualized marketing efforts, referencing work of the RTO program and results of the 2005 Rideshare Study.
 - *Parking* – information about the effect of parking cash-out programs and elimination of parking subsidies on mode choice.
- Update modal requirements sections of Chapter 6 to incorporate the following recommendations of this report:
 - Suggested changes to existing requirements for TMAs and Fareless Areas, pending a discussion of these elements during the RTP update process.
 - Potential new minimum requirements as described earlier in this report.
 - Expanded and reorganized description of secondary, optional strategies, including additional information about best practices for implementation, applicability to different parts of the region, and primary authority or responsibility for implementation.
 - Summarize proposed new procedures for measuring impacts of required strategies on mode share, clearly delineating roles of Metro and local governments.
 - Summarize proposed procedures for monitoring compliance with existing and new minimum strategies.
 - Include summary information from Appendices 1.8 and 2.2 related to the relationship between modal targets and RTP modeling assumptions and which types of assumptions are included in the model. Retain detailed information about model assumptions (e.g., table in Appendix 1.8) in the appendices.
- Update appendices 1.8 and 2.2 to incorporate the results of this study and further efforts to refine assumptions and analytical procedures within the regional travel model.

Chapter 4. Next Steps

Results of this project will inform the upcoming update of the RTP, as well as related efforts to update the region's Travel Behavior Survey and regional travel model. Next steps for Metro and local jurisdictions include the following:

- Present findings and recommendations to the RTO Subcommittee, TPAC, JPACT and the Metro Council for consideration and refinement.
- Prepare a newsletter summarizing the results of this study and next steps for implementation.
- Post newsletter and final report on Metro's Web site.
- Incorporate recommendations in updating the Travel Behavior Survey questionnaire and subsequent analysis.
- Consider suggestions for updating the regional travel model.
- Consider recommendations for amending the RTP as part of the upcoming update process.
- Implement recommendations for measuring the impact of strategies to affect mode share as described in this report and per results of the RTP update process.
- Incorporate suggestions for new procedures to monitor RTP compliance per results of the RTP update process.
- Work with local jurisdictions to encourage employers, state officials and others to pursue selected strategies, as described in this report.
- Consider results of this project in RTO program and TMA efforts to encourage use of alternative modes and TDM techniques.
- Prepare additional fact sheets as needed, detailing the results of this study and next steps for implementation. Distribute to local governments, transit agencies, employee commute coordinators, state officials, TMAs and others.